SPATIAL PATTERNS OF SOME PHYSICAL AND CHEMICAL VARIABLES IN PASSAMAQUODDY BAY AND LETANG INLET, SOUTHWESTERN BAY OF FUNDY, SEPTEMBER 1999

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ABSTRACT

Bugden, J.B.C., B.T. Hargrave, P.M. Strain and A.R.J. Stewart (Eds). 2001. Spatial patterns of some physical and chemical variables in Passamaquoddy Bay and Letang Inlet, southwestern Bay of Fundy, September 1999. Can. Tech. Rep. Fish. Aquat. Sci. iv + 96 p.

89 stations were occupied in Passamaquoddy Bay and Letang Inlet, southwestern Bay of Fundy, New Brunswick between 7 and 17 September, 1999. Water samples were collected for analysis of salinity, dissolved inorganic nutrients and dissolved organic carbon (DOC). Near-bottom water samples were collected for salinity, nutrients and DOC and also for suspended matter grain size analysis. Sediment samples taken from 61 stations with a 0.10 m^2 grab were analyzed for temperature, percent organic matter, percent water, pH, sulfide, redox (Eh) potential, grain size and trace metal concentrations. Geo-referenced data for variables are listed in tables, graphs and maps to indicate spatial patterns. For most variables, highest values were observed in Back Bay and close to a processing plant in Black's Harbour. In central Letang Inlet, away from fish plant effluents, values of all variables reflected background conditions more typical of offshore areas in the Bay of Fundy. Fewer samples (n=27) were collected in Passamaquoddy Bay but higher values for most variables along the northern and western margins possibly reflected land-based inputs of dissolved and particulate matter.

RÉSUMÉ

Bugden, J.B.C., B.T. Hargrave, P.M. Strain and A.R.J. Stewart (Eds). 2001. Spatial patterns of some physical and chemical variables in Passamaquoddy Bay and Letang Inlet, southwestern Bay of Fundy, September 1999. Can. Tech. Rep. Fish. Aquat. Sci. iv + 96 p.

Entre le 7 et 11 17 septembre 1999, 89 stations ont été occupées dans la baie Passamaquoddy et l'estuaire de Letang, dans le sud-ouest de la baie de Fundy (Nouveau-Brunswick). Des échantillons d'eau ont été recueillis en vue de la mesure de la salinité, de la matière nutritive inorganique dissoute et du carbone organique dissous (COD). Des échantillons ont également été prélevés près du fond en vue de la mesure de la salinité, de la matière nutritive inorganique dissoute et du COD, ainsi que pour l'analyse granulométrique de la matière en suspension. Des échantillons de sédiment, prélevés avec une benne de 0,10 m^2 à 61 stations, ont été soumis aux analyses suivantes : température, pourcentage de matière organique, pourcentage d'eau, pH, sulfure, potentiel rédox (Eh), granulométrie et concentrations des métaux traces. Les données géoréférencées sur les variables sont présentées dans des tableaux, des graphiques et des cartes pour faire ressortir les patrons spatiaux. Pour la plupart des variables, les valeurs les plus hautes ont été observées à Back Bay et à Black's Harbour, près d'une usine de transformation du poisson. Dans le centre de l'estuaire de Letang, à l'écart des effluents des usines de poisson, les valeurs de toutes les variables correspondaient aux conditions de base typiques des zones hauturières de la baie de Fundy. Un plus petit nombre d'échantillons (n=27) a été recueilli dans la baie Passamaquoddy, mais les tendances faisaient ressortir des valeurs plus élevées des variables le long des marges nord et sud, ce qui peut correspondre à des apports fluviatiles de matière particulaire dissoute.

INTRODUCTION

Passamaquoddy Bay and Letang Inlet occupy a high water area of about 126 sq. km of southwestern New Brunswick (Fig. 1). Passamaquoddy Bay (Fig. 2) is separated from the Bay of Fundy by Deer Island and covers an area of about 98.5 km^2 (at high water) (Gregory *et al.*, 1993). Letang Inlet (Fig. 3) is a tidal inlet of approximately 15 km in length (27.3 km^2 at high water) and consists of a number of small embayments - Scotch Bay, Lime Kiln Bay, Back Bay, Bliss Harbour, and Black's Harbour. Both are dominated by the tides of the Bay of Fundy, with spring tides greater than 8 m. Passamaquoddy Bay is influenced by several rivers, the most significant being the St. Croix; it has a watershed area of 2724 km^2, and has a tidal/freshwater volume ratio of 377.53. The Letang Inlet has a far smaller watershed area (86 km^2) and a greater tidal/freshwater ratio (1908.38) making the influence of freshwater negligible.

Both Passamaquoddy Bay and Letang Inlet are affected by human activities. The bay is influenced by the sewage discharge from Calais, ME and St. Stephen, NB on the St. Croix river and by the discharge from St. Andrews, NB on the bay itself. The Letang Inlet is subject to the discharge of a sewage treatment plant, a fish plant in Black's Harbour and discharge of a pulp mill near Lake Utopia at the upper end of the inlet (Strain *et al.* 1995). Since 1980 licensed sites for finfish aquaculture have increased considerably (Fig. 1). In 1999, salmon aquaculture in the Passamaquoddy/Letang region produced approximately 3570 metric tonnes (B. Chang, personal communication).

Given that all of these activities discharge wastes that can influence both water and sediment, past studies have been focussed on the near-field effects of organic enrichment by aquaculture (Hargrave *et. al.*, 1995) and more wide spread variations in dissolved nutrient and oxygen concentrations (Strain *et al.*, 1995, Strain and Clement, 1996). Here we report preliminary data collected as part of the DFO Environmental Science Strategic Research Fund project *Environmental Studies of Sustainable Aquaculture* (ESSA). The focus of this project starting with the preliminary observations in 1999 reported here has been to examine the far-field effects of aquaculture and other sources of organic matter input to the Passamaquoddy/Letang region.

METHODS

SAMPLING

Water samples from 87 stations, sediment cores from 5 stations, and bottom grab samples from 60 stations were collected from September 7 to 17, 1999 at 89 stations in Passamaquoddy Bay and Letang Inlet from either the CCGS Hart or CCGS Pandalus (Figs. 4 and 5). Station locations (latitude and longitude) were recorded from the ship's differential GPS navigation system; water depths were obtained from the ship's depth sounder. Water samples for dissolved organic carbon (DOC), dissolved inorganic nutrients, and salinity were taken using a 5 liter-Niskin bottle suspended on a hydrowire and tripped at the appropriate depth using a brass messenger. DOC samples were collected from the Niskin in a 125-ml fluorinated-polyethylene wide-mouth bottle (Nalgene). Approximately 50-ml were transferred to an acid-washed glass 60-ml syringe

and filtered through a pre-ashed GF75 glass fibre filter (Micro Filtration Systems, Dublin, California) into a clean 125-ml bottle; the sample was then frozen until analysis. The 125-ml collection bottle, syringe and teflon filter holder were rinsed with low DOC Super Q water and re-used, the GF75 filter was discarded. Salinity samples were collected in glass salinity bottles and stored for analysis. Nutrient samples were collected in 30-ml high-density polyethylene bottles and frozen as soon as practical.

Water samples for dissolved copper (Cu) analysis were collected using a 5-liter lever-action Niskin bottle. Samples were filtered on site through rinsed Gelman Aqua Prep cartridges (cat.# 12026). Cartridges were cleaned prior to use by flushing with 2 liters of filtered high-purity 18 megaohm water (SQ) in the Marine Chemistry clean laboratory.

Near-bottom water samples were collected using a modified bottom-operated seston sampler (B.O.S.S.) (referred to here as brother of BOSS)(B.O.B.). The device, described in Muschenheim *et al.* (1995), is capable of collecting water at known levels above the bottom within 0.5 m of the seabed. B.O.B. consists of a tripod frame that when lowered to the bottom pivots to orient intake apertures into the prevailing current before samples are withdrawn into 2-liter collection chambers at 5 depths (5, 15, 25, 35 and 45 cm) above the bottom. A timing device is used to allow sediment resuspended from the impact of B.O.B. to settle or be advected prior to sample collection.

Sediment cores from the transects at Dick's Island, Indian Point, Ministers Island, and Tongue Shoal in Passamaquoddy Bay (Fig. 5) were obtained with a Kajak gravity corer fitted with a core catcher and a 50 cm long by 4.7 cm in diameter plexiglass core liner. Each core liner had been pre-drilled with 7 mm diameter holes at 5 cm intervals in a helical pattern. Bottom grabs were collected by Hunter Grab (0.10 m^2). Sediment temperature, Eh, sulfide, and pH were recorded immediately after sample retrieval. Large-diameter cores were collected using a Lehigh gravity corer fitted with a core catcher: cores up to 1 m in length were split on deck soon after collection and samples removed for grain size.

WATER COLUMN MEASUREMENTS

Salinity

Salinity was measured with a Guildline AutoSal Model 8400 salinometer. Samples were standardized with IAPSO P-series normal standard seawater (K = 15).

Dissolved Inorganic Nutrients and Dissolved Copper

Dissolved inorganic nutrient analyses were performed according to the methods of Strain and Clement (1996) using colourimetric techniques and a segmented flow Technicon AutoAnalyzer II (AA II). Cu in the filtered seawater samples was extracted in the DFO Marine Chemistry clean laboratory at Bedford Institute of Oceanography and analyzed by graphite furnace atomic absorption spectroscopy with Zeeman background correction following the method of Danielsson *et al.* (1982). The analysis of NRC reference material CASS-4 was used to check the accuracy and precision of the method.

Dissolved Organic Carbon

Frozen DOC samples were thawed overnight at 5° C prior to analysis. Ten (10) ml of sample were decanted into an acid washed 25-mL fluorinated-polyethylene bottle (Nalgene) into which 40 µl of 40% phosphoric acid had been placed. The thawed sample was mixed and 3.1 ml of the acidified sample transferred to a 4-ml amber vial. Analysis of the contents of duplicate vials then was performed using a MQ1001 total carbon analyzer (MQ Scientific, Ada OK) attached to a LICOR CO_2 detector and a computer running PeakSimple for Windows (ver. 1.83). As part of the automated analysis, the sample was sparged with ultra pure oxygen for 5 minutes prior to injection and three injections were made per vial. The area under each peak of six individual replicates was determined with the PeakSimple software and the concentration of DOC (µM C) was calculated from mean peak area and standards run at both the beginning, and end of the run.

SEDIMENT MEASUREMENTS

Temperature

Temperature in surface sediment samples was recorded using the temperature probe included as part of the pH electrode assembly. Water temperature was obtained by placing a glass alcohol thermometer in a bucket containing surface water and recording the temperature after a few minutes.

Percent Water

Approximately 5-ml of sediment from the grabs was placed into a pre-weighed scintillation vial, weighed, and dried at 60° C for 48 hours. Scintillation vials and contents were re-weighed and the difference in weights recorded as percent moisture (water content).

Percent Organic Matter

A sub-sample of the dried sediment used to determine percent moisture was placed in a pre-weighed foil cup and the weight recorded. The sample was then place into a muffle furnace and ashed (550° C, 4 hr). Weight loss on ignition was compared to the pre-ashed weight and the difference recorded as percent organic matter.

pH

pH was determined using an Accumet 1003 portable meter equipped with a Fisher 13-620-111 pH electrode. The electrode was inserted into the top 2 cm of sediment through the same hole drilled in the core used for the Eh (redox) electrode as described below. A stable reading was usually observed after 1-2 minutes.

Sulfide

Sulfide measurements were made using an Accumet AP25 portable ion meter (see Anon. 1997) equipped with an Orion silver/sulfide half-cell electrode (model 9416) and an Orion 90-01 reference electrode. The electrodes were placed in a plastic vial to which 5-ml of sediment and 5-mL of sulfide anti-oxidant buffer (SAOB) solution. L-ascorbic acid was added to the SAOB following the procedures to calibrate the Accumet meter using three standard concentrations (10, 100 and 1000 µM $S^{=}$) as described in Hargrave et al.

(1995). The same procedure is described in Wildish *et al.* (1999) for a two point calibration (100 and 1000 μM $S^{=}$). The use of a three point calibration provides a standard curve over a the range of concentrations selected and avoids extrapolation beyond the range of concentrations used as standards. The ion meter was set to auto-stabilize mode. When the electrode was used to slowly mix the sediment-buffer slurry, a stable reading as μM $S^{=}$ was usually recorded after 1 minute

Redox Potential

Redox potential (Eh) relative to a normal hydrogen electrode (NHE) was measured using an Orion platinum redox electrode (Model 96-78-00) filled with saturated 4 M KCl reference solution and an Accumet AP25 portable meter (see Anon. 1997) as outlined in Wildish *et al.* (1999). [Note that use of a diluted filling solution, 0.2 M KCl, was incorrectly reported in Wildish et al. 1999]. The electrode was inserted horizontally into the top 2 cm of sediment through a hole drilled in the core tube and left in place until a stable mV reading was obtained (usually 2-3 minutes). Care was taken not to move the electrode during the time required for a stable reading to be obtained with the ion meter set to auto-stabilize mode.

CORE ANALYSES

Grain Size

The disaggregated inorganic grain size (DIGS) of each sample was determined using the electro-particle sizing techniques of Milligan and Kranck (1991). Sediment samples were placed in 20 ml Pyrex beakers, weighed wet, air-dried, and subsequently re-weighed. The samples were then digested in an excess of 35% H_2O_2, weighed again, suspended in 1% NaCl, and finally disaggregated with a sapphire tipped sonic probe. The DIGS distributions were determined using the Coulter Multisizer IIe over a size range of 0.87 - 500 μm. Results were plotted as $\log_{10}$ equivalent weight percentage of sediment versus $\log_{10}$ diameter. Percent weight of sediment was calculated using a specific gravity of 2.65 kg m^{-3} and then normalized to total sediment weight in the size range analyzed. Diameters are reported as the midpoint of the size class based on a 1/5 ϕ interval (where diameter doubles every 5 multisizer channels).

Trace Metals

Sediment samples were dried at 60° C prior to homogenization with a mortar and pestle. Samples were analyzed by Chemex Labs using the geochemical procedure T127 total metals package. Samples are triple acid digested, subjected to Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) to ensure low base metal concentrations, and subsequently analyzed using Inductively Coupled Plasma Mass-Spectometry (ICP-MS). Arsenic and mercury were analyzed independently through optimized geochemical methods. Standards were also included in the analysis to ensure quality control. Statistics were obtained using GB Stat statistical software (Dynamic Microsystems, Inc., Silver Spring, MD). Results are reported as ppm on a sediment dry weight basis.

DATA PRESENTATION

Proportional post maps were created to illustrate the distribution of different variables in the Letang/Passamaquoddy area at the time of the study using Surfer® 7.0, a contouring and 3D-surface mapping program (Golden Software, Inc., Golden, CO). Proportional postmaps are useful for indicating spatial trends since they provide a plot of symbol size in proportion to the magnitude of variables measured at a geo-referenced location.

Data for water and sediment variables measured at various stations in different hydrographic areas described in Table 1 are summarized in Tables 2 and 3. A brief discussion of the data is followed by tables and postmaps for all variables. All data used to derive tables and postmaps are tabulated in 7 appendices: A – a summary of sample operations performed at each station; B - data for salinity and Cu; C – data for dissolved inorganic nutrients (ammonia, nitrate, nitrite, phosphate and silicate) from Niskin bottles; D – dissolved inorganic nutrients in B.O.B. casts; E - DOC data from Niskin and B.O.B. casts; F – data from sediment grab samples; G – data for trace metal analysis.

RESULTS AND DISCUSSION

Tables 2 and 3 list arithmetic means (± 1SD) for all variables calculated for various sub-regions of Passamaquoddy Bay and Letang Inlet. Regins are listed in Table 1and shown in Figs. 2 and 3.

Salinity, Dissolved Inorganic Nutrients and Dissolved Copper

The areal distribution of salinity in surface waters indicates that the region as a whole is a well-mixed system influenced by river discharge. The influence of fresh water along the northern and western shores of Passamaquoddy Bay (Fig. 6), and the northern end of the Letang Inlet (Fig. 7), is apparent in the lower average salinities in both Inner Passamaquoddy Bay and the Upper Letang regions (Table 2).

The results of water-column nutrient analyses exhibited complex patterns. Ammonia (NH_3) concentrations in Passamaquoddy Bay (Fig. 8) tended to be highest at more southern stations (14, 15, and 16). This pattern was generally similar for other nutrients (NO_3^- in Fig. 9; NO_2^- in Fig. 10; $PO_4^{\equiv}$ in Fig. 11; silicate in Fig. 12).

The Letang Inlet, an area of intense tidal mixing, exhibited fairly uniform nutrient concentrations. Variations in concentration on the proportional post maps are generally small and reflect expected regional variations (Figs. 13, 14, 15, 16, and 17). However, there are "hot spots" of higher nutrient concentration elevated above background levels in Back Bay (stations 27, 28, 29, 30, 31, 98, and 99) and Black's Harbour (stations 81 and 82). A similar pattern was observed in these areas in 1994 (Strain and Clement, 1996). This is also borne out with the sub-region averages (Table 2) that show that Back Bay and Black's Harbour had higher nutrient concentrations in comparison with other areas. These higher concentrations could reflect the presence of a fish plant in Black's Harbour, and fish farms in Back Bay (Strain *et al.*, 1995; Strain and Clement, 1996).

Data for dissolved Cu (Fig. 18) can be compared with observations made in the same area in the early 1990's by Yeats and Daziel (unpublished data). In 1999, dissolved Cu concentrations were close to background levels (approximately 0.2 $\mu g\ l^{-1}$), with the exception of one station in Back Bay (station 99) and two stations in the Letang Channel (stations 60 and 63) which were slightly elevated above background levels. The sources of these increased Cu concentrations are not known. The concentrations observed in 1999, however, were all considerably lower than those found in the 1994 survey (average concentration of 3.7 $\mu g\ l^{-1}$ with a range of 1.5 to 9.3 $\mu g\ l^{-1}$).

Dissolved Organic Carbon (DOC)

DOC is by far the largest fraction of biogenic carbon in marine ecosystems, out-weighing particulate organic carbon (POC) by more than 10 to 1 (Kepkay, 2000). As a result, measurements of DOC provide the most direct means of assessing water-column carbon loads. In Passamaquoddy Bay (Fig. 19), DOC concentrations were higher to the north and west, presumably due to the discharge of terrestial carbon by rivers. In the Letang Inlet, the distribution of DOC in surface waters is patchy (Fig. 20). This may be a function of an environment that is both physically and biologically dynamic, but is also a function of diverse carbon inputs (eg. from rivers, terrestrial runoff, sewage and aquaculture).

Sediment Variables

Sediment redox potential (Eh) has been used as an index of the degree to which the sediment is anaerobic (Hargrave *et al.*, 1997). In Passamaquoddy Bay, sediment Eh (Fig. 21) exhibited no distinct pattern, but sulfide concentrations were higher to the north of the bay than in sediments to the south (Fig. 22). A similar trend in sediment temperature was also apparent (Fig. 23), although sediment pH showed no discernable trend (Fig. 24). Generally speaking the values of most variables were lower in Passamaquoddy Bay than in the Letang Inlet (Table 3).

In the Letang Inlet, Eh was higher in the more central stations, decreasing towards the north and south (Fig. 25). Sediment sulfide concentrations (Fig. 26) provided the most dramatic picture of changing conditions in the sediment, where 2 stations in Back Bay (31) and Blacks Harbour (81) had >90,000 μM sulfide. Given that redox potentials and sulfide concentrations have been used as indicators of organic enrichment (Hargrave *et. al.*, 1995, 1997), maximum organic enrichment was reflected at the two sites. This is also evident from values for average sulfide concentrations and organic matter (Table 3).

Sediment temperature and pH (Figs. 27 and 28) followed a similar trend to the decrease in Eh from central to more northerly and southerly locations. Sediment pH was lowest at stations in Back Bay and Lime Kiln Bay and tended to increase towards the south and east. This pattern is consistent with expected higher levels of anaerobic metabolism in sulfide-rich sediments in these locations. High rates of sulfate reduction would increase hydrogen ion (H^+) concentration and result in reduced pH. Sediment temperature was highest at the mouth of Lime Kiln Bay, but was also high throughout Letang Channel and into Scotch Bay.

Percent organic matter was higher in Back Bay, Lime Kiln Bay, Black's Harbour and the northern margin of Passamaquoddy Bay than in the other areas (Figs. 29, 30 and Table 3). One possible source of additional organic matter could be salmon aquaculture sites in Back Bay and Lime Kiln Bay, but a fish processing plant in Black's Harbour, and terrestrial (riverborne) sources along the northern margin of Passamaquoddy Bay also contribute organic matter. The percent water in the sediments was fairly uniform throughout the region although values were slightly higher in Back Bay (Figs. 31, 32 and Table 2).

Transects

There did not appear to be any strong trends in the variables measured in sediment collected along transects by grab (Tables 4, 5, 6 and 7). Possible exceptions were sulfide concentration on the Ministers Island transect, which exhibited a general increase from stations 1 through 21 (Table 4), and along the Indian point transect (Table 5).

Core Analysis

Trace metal analyses

The concentration of trace metals within Passamaquoddy Bay and Letang Inlet were similar to concentrations observed in sediments from other Atlantic coastal embayments (Loring *et al.* 1996). Only Cr and Ni were elevated with respect to background data. Metal concentrations were consistent throughout the entire study area.

Trace metal concentrations were analysed using correlation matrices and factor analyses (Loring *et al.* 1996). There was a strong correlation between metal concentrations and fine-grained sediment (<64 μm). A Varimax analysis was used to determine associations between metals (Table 8). Factor 1 is the sedimentation factor, representing the accumulation of fine-grained aluminosilicates with their accompanying lattice trace metals in response to the present depositional conditions. This factor accounts for 30.5% of the total variance. Factor 1 has significant loadings on <64 μm on Al, Ba, Bi, Ce, Cs, Cr, Co, Ga, Ge, Fe, La, Li, Mg, Ni, Te, Ti, and V.

Factor 2 accounts for 11.7% of the total variance. This factor has significant loadings on Cd, Cu, Mo, P, Tl. U, and Zn. It represents the enrichment of these metals from anthropogenic sources above background levels. Cu is used in antifoulants applied to net pens used in salmon aquaculture. It is likely that the carriers of these metals are authigenic sulphides. Factor 3 represents accumulation of mainly rare earth group of elements most likely derived from the glacial erosion of the coastal granitic rocks and their associated pegmatites. Factor 3 explained 18.4% of the total variance, with significant loadings on Be, Ce, Ga, La, Li, Nb, Rb, Ag, Ta, Th, Ti, W, and Y.

Factor 4 (6.25% of the total variance) had significant loadings on Bi, Pb, Mn, and Te.
Factor 5 (5.93% of the total variance) has significant loadings on P and Na and most likely reflects the contribution of sea salts to the samples.

Factor 6 (6.41% of the total variance) has significant loadings on Ca and Sr. It is identified as the carbonate factor and reflects the contribution from calcareous material.
Factor 7 (3.82% of the total variance) has significant loadings on As and Sb.

The correlation between trace metals and fine-grained sediment can be of particular concern in regions dominated by floc settling (Milligan and Loring, 1997). As seen in the DIGS results, Passamaquoddy Bay, Bliss Harbour, Scotch Bay, and Lime Kiln Bay could be potential sinks for trace metal accumulation. Further study of the depositional history in these areas is required to evaluate these results.

Zinc (Zn) is a supplement added to salmon feed and thus may be useful to assess the impact of salmon aquaculture on the surrounding ecosystem. Cu is used in antifoulants and while usage has decreased recently, Cu in sediments could reflect earlier applications. In Passamaquoddy Bay, there appear to be small differences in Cu and Zn concentrations between sites (Figs. 33 and 35). Concentrations of Zn appeared to be slightly elevated towards the north and west. In the Letang Inlet (Figs. 34 and 36), Cu and Zn were both elevated in Lime Kiln Bay and in the northern section of Back Bay. Processes and factors involved in creating these distribution patterns have yet to be determined.

Grain Size

The depositional history of the sediment can be determined through the analysis of the disaggregated inorganic grain size (DIGS) (Kranck *et al.*, 1996a, b; Milligan and Loring, 1997). Particle size distribution plots derived from the DIGS analysis of bottom sediments show a combination of material deposited as flocs and single grain settled material throughout Passamaquoddy Bay and the Letang Inlet (Figs. 37, 38, 39, 40, 41, 42, and 43). The floc portion of the curve remains relatively consistent throughout the study area.

These results from 1999 are consistent with a study of bottom sediments within Letang Inlet in 1990 (Milligan, 1994). Fine-grained sediment, indicative of a low energy depositional environment, occurred within Bliss Harbour, Scotch Bay, and Lime Kiln Bay. DIGS spectra from station 62 shows a high concentration of well-sorted coarse material in proportion to finer-grained sediment reflecting higher bottom shear stress in Letang Harbour. The results show that both Passamaquoddy Bay and the Letang Inlet are dominated by highly flocculated fine-grained sediment. The rate of flocculation depends upon the concentration of particles within the water column. Consequently, an increase in the amount of particulate matter entering the Inlet, especially organically rich material, could significantly enhance the depositional rate of fine particulate matter.

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Table 1. List of stations in designated hydrographic areas (shown Figs. 2, 3, 4 and 5) used to calculate mean values for variables in Tables 2 and 3.

Area	Number	Station Numbers
Back Bay	14	21,22,23,24,25,26,27,28,29,30,31,45,98,99
Black's Harbour	2	81,82
Bliss Harbour	11	33,34,35,37,38,39,40,42,43,44,47
Deadman's Harbour	2	85,87
Letang Channel	4	60,61,62,63
Lime Kiln Bay	8	49,50,51,53,54,55,56,57
Pass. Bay (inner)	8	1,2,3,4,5,6,7,8
Pass. Bay (middle)	15	9,12,13,14,15,16,88,89,90,91,93,94,95,96,97
Pass. Bay (outer)	3	17,18,19
Upper Letang	13	64,66,67,68,69,70,71,73,74,76,78,79,80
Ungrouped Stations	5	20,32,83,84,102

Table 2. Mean (±SD) values for water column variables for designated areas in the Passamaquoddy Bay/Letang Inlet region, sampled 7-17 September, 1999. Areas are illustrated in Figs. 2 and 3.

Area	Salinity	Silica (µM)	Phosphate (µM)	Nitrate (µM)	Ammonia (µM)	Nitrite (µM)	DOC (µMC)
Back Bay N=14	32.381 (0.017)	3.06 (0.49)	1.23 (1.85)	2.03 (0.43)	3.71 (2.04)	0.25 (0.062)	124.8 (35.8)
Blacks Harbour[1] N=2	32.335 (32.341) (32.330)	2.08 (2.18) (1.97)	1.41 (2.09) (0.74)	1.93 (2.15) (1.71)	12.99 (21.06) (4.91)	0.34 (0.34) (0.33)	166.0 (173.1) (158.8)
Bliss Harbour N=11	32.336 (0.028)	1.84 (0.76)	0.60 (0.16)	0.96 (0.40)	2.47 (0.89)	0.14 (0.08)	123.1 (20.4)
Deadmans Harbour[1] N=2	32.347 (32.355) (32.338)	1.37 (1.68) (1.06)	0.55 (0.61) (0.49)	0.67 (1.02) (0.32)	1.17 (1.25) (1.10)	0.16 (0.20) (0.13)	118.8 (124.8) (112.8)
Letang Harbour N=4	32.035 (0.418)	1.25 (0.20)	0.63 (0.04)	1.03 (0.14)	2.37 (0.40)	0.15 (0.03)	138.7 (19.9)
Lime Kiln Bay N=8	32.286 (0.041)	1.14 (0.08)	0.62 (0.04)	1.03 (0.15)	2.67 (0.24)	0.14 (0.02)	135.0 (29.6)
Pass. Bay Inner N=8	31.542 (0.303)	1.83 (0.76)	0.45 (0.07	0.27 (0.03)	1.58 (0.15)	0.05 (0.01)	141.4 (39.0)
Pass. Bay Middle N=15	32.049 (0.162)	1.52 (0.89)	0.46 (0.12)	0.71 (0.87)	1.93 (0.66)	0.10 (0.05)	114.5 (34.4)
Pass. Bay Outer N=3	31.936 (0.059)	1.35 (0.19)	0.51 (0.01	0.40 (0.06)	1.95 (1.10)	0.07 (0.03)	80.6 (7.2)
Upper Letang N=13	31.83 (0.409)	2.14 (2.08)	0.85 (0.33)	1.03 (0.75)	2.76 (1.07)	0.20 (0.13)	207.6 (97.9)
Ungrouped Stations N=5	32.399 (0.032)	3.08 (0.77)	0.70 (0.05)	2.59 (0.66)	2.40 (0.51)	0.24 (0.05)	100.4 (34.6)

NOTES: 1 – Only 2 stations. First number – average; second number – maximum; third number – minimum.

Table 3. Mean (±SD) values for sediment variables for designated areas in the Passamaquoddy Bay/ Letang Inlet region, sampled 7-17 September, 1999. Areas are illustrated in Figs. 2 and 3.

Area	Temp. °C	pH	Eh-NHE (mV)	Sulfide (μM)	% Organic	% Water	Zn (ppm)	Cu (ppm)
Back Bay N=11	13.3 (0.2)	7.02 (0.26)	-40 (37)	14600 (36500)	7.86 (1.48)	64.80 (3.28)	99 (8)	21 (4)
Blacks Harbour[1] N=2	13.2 (13.2) (13.1)	7.15 (7.15) (7.14)	-78 (-120) (-35)	55000 (97000) (13000)	7.47 (8.01) (6.93)	61.44 (62.38) (60.49)	109 (122) (96)	25 (27) (22)
Bliss Harbour N=10	13.4 (0.2)	7.11 (0.25)	7 (25)	330 (4200)	7.10 (0.70)	62.79 (3.10)	100 (16)	21 (5)
Deadmans Harbour N=2	12.4 (12.4) (12.3)	7.51 (7.52) (7.50)	-2 (-16) (12)	47 (65) (29)	5.88 (6.10) (5.66)	61.32 (64.88) (57.76)	88 (96) (80)	16 (16) (15)
Letang Harbour N=1	17.2[2]	7.37[2]	-59[2]	180[2]	2.86[2]	32.83[2]	7[2]	52[2]
Lime Kiln Bay N=8	16.2 (2.4)	6.80 (0.53)	-69 (22)	1553 (934)	7.39 (3.24)	55.00 (15.62)	103 (22)	27 (10)
Pass. Bay Inner N=7	15.6 (1.2)	6.93 (0.29)	13 (23)	2600 (966)	7.78 (0.44)	63.88 (1.99)	100 (3)	17 (1)
Pass. Bay Middle N=5	14.1 (0.4)	7.27 (0.17)	26 (32)	740 (730)	5.71 (2.34)	55.53 (16.29)	91 (10)	16 (2)
Pass. Bay Outer[1] N=2	14.4 (14.6) (14.1)	7.13 (7.15) (7.10)	15 (30) (0)	270 (310) (220)	6.11 (6.17) (6.04)	53.63 (55.28) (51.97)	85 (86) (84)	14 (14) (13)
Upper Letang N=13	16.3 (0.2)	7.21 (0.21)	-50 (33)	1990 (2500)	6.86 (1.06)	62.77 (5.42)	90 (5)	17 (3)
Ungrouped Stations N=5	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]

NOTES: 1 – Only 2 stations. First number – average; second number – maximum; third number – minimum. 2 – Only 1 grab obtained in this area. 3 – No grabs obtained in this area.

Table 4. Variables measured from sediment grabs along the Ministers Island Transect (Fig. 4), September 8, 1999.

Transect Stn	Latitude (N)	Longitude (W)	Sediment Grab					
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (μM)	pH	Sediment Temp. (°C)	Water Temp. (°C)
MI1	45° 05.530'	67° 02.150'	-212	-3	150	7.44	14.6	16.7
MI2	45° 05.505'	67° 02.015'	-216	-7	1100	7.23	14.4	16.3
MI3	45° 05.480'	67° 01.880'	-207	2	580	7.36	14.3	16.5
MI4	45° 05.455'	67° 01.610'	-173	36	270	7.19	14.6	16.6
MI5	45° 05.405'	67° 01.475'	-183	26	620	7.15	14.5	16.8
MI6	45° 05.380'	67° 01.340'	-164	45	290	7.29	14.5	17.1
MI7	45° 05.355'	67° 01.205'	-166	43	400	7.15	14.5	16.8
MI8	45° 05.330'	67° 01.070'	-165	44	310	7.39	14.9	17.0
MI9	45° 05.305'	67° 00.935'	-187	22	770	7.30	14.8	16.9
MI10	45° 05.280'	67° 00.800'	-228	-19	730	7.34	13.6	16.7
MI11	45° 05.255'	67° 00.665'	-209	0	1200	7.27	14.5	16.9
MI12	45° 05.230'	67° 00.530'	-212	-3	920	7.35	14.1	16.7
MI13	45° 05.205'	67° 00.395'	-203	6	680	7.19	14.0	16.0
MI14	45° 05.180'	67° 00.260'	-197	12	950	7.25	14.2	16.0
MI15	45° 05.155'	67° 00.125'	-193	16	1100	7.31	14.3	16.1
MI16	45° 05.130'	66° 59.990'	-199	10	1100	7.24	14.4	15.9
MI17	45° 05.105'	66° 59.855'	-213	-4	1100	7.22	14.6	15.8
MI18	45° 05.080'	66° 59.720'	-203	6	1400	7.28	14.4	15.5
MI19	45° 05.055'	66° 59.585'	-193	16	1300	7.28	15.0	15.8
MI20	45° 05.030'	66° 59.450'	-176	33	1200	7.36	14.8	15.8
MI21	45° 05.005'	66° 59.315'	-207	2	1000	7.42	14.3	15.5

Table 5. Variables measured from sediment grabs along the Indian Point Transect (Fig. 4), September 7, 1999.

Transect Stn	Latitude (N)	Longitude (W)	Sediment Grab					
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (μM)	pH	Sediment Temp. (°C)	Water Temp. (°C)
IP1	45° 03.970'	66° 59.600'	-226	-17	150	7.46	14.4	
IP2	45° 04.008'	66° 59.724'	-189	20	1100	7.34	16.0	
IP3	45° 04.047'	66° 59.847'	-214	-5	1000	7.50	15.6	16.1
IP4	45° 04.085'	66° 59.971'	No Sample – Rocky sandy bottom – 3 tries					16.0
IP5	45° 04.124'	67° 00.095'	-226	-17	140	7.52	15.1	16.0
IP6	45° 04.162'	67° 00.218'	-212	-3	130	7.41	14.7	16.0
IP7	45° 04.201'	67° 00.342'	-212	-3	1200	7.69	15.7	15.9
IP8	45° 04.239'	67° 00.466'	-196	13	1100	7.40	14.8	16.0
IP9	45° 04.277'	67° 00.589'	-232	-23	2200	7.49	15.6	16.0
IP10	45° 04.316'	67° 00.713'	-204	5	720	7.54	14.7	16.1
IP11	45° 04.354'	67° 00.837'	-199	10	1100	7.42	15.1	16.1
IP12	45° 04.393'	67° 00.961'	-231	-22	280	7.56	15.4	16.0
IP13	45° 04.431'	67° 01.084'	-214	-5	1500	5.16	15.7	15.9
IP14	45° 04.469'	67° 01.208'	-218	-9	1400	7.44	15.9	16.0
IP15	45° 04.508'	61° 01.332'	-183	26	2200	7.42	15.9	15.9

Table 6. Variables measured from sediment grabs along the Dick's Island Transect Fig. 4), September 15, 1999.

Transect Stn	Latitude (N)	Longitude (W)	Sediment Grab					
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (μM)	pH	Sediment Temp. (°C)	Water Temp. (°C)
DI1	45° 08.020'	66° 58.300'	-259	-50	1100	7.16	14.7	
DI2	45° 08.020'	66° 58.400'	-278	-69	4900	6.99	14.6	
DI3	45° 08.020'	66° 58.500'	-274	-65	2900	7.04	14.6	
DI4	45° 08.020'	66° 58.600'	-273	-64	3100	7.17	15.0	
DI5	45° 08.020'	66° 58.700'	-258	-49	2900	7.06	15.6	
DI6	45° 08.020'	66° 58.800'	-268	-59	1600	7.18	15.6	
DI7	45° 08.020'	66° 58.900'	-269	-60	2400	7.18	15.7	
DI8	45° 08.020'	66° 59.000'	-277	-68	2700	7.15	15.7	
DI9	45° 08.020'	66° 59.100'	-272	-63	1600	7.15	15.7	
DI10	45° 08.020'	66° 59.200'	-282	-73	520	7.05	15.9	
DI11	45° 08.020'	66° 59.300'	-268	-59	1900	7.07	15.9	
DI12	45° 08.020'	66° 59.400'	-271	-62	4100	7.01	15.7	
DI13	45° 08.020'	66° 59.500'	-270	-61	4600	7.20	15.8	
DI14	45° 08.020'	66° 59.600'	-272	-63	2100	6.91	15.8	

Table 7. Variables measured with samples from sediment grabs taken along the Tongue Shoal Transect (Fig. 4), September 7, 1999.

Transect Stn	Latitude (N)	Longitude (W)	Sediment Grab					
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (μM)	pH	Sediment Temp. (°C)	Water Temp. (°C)
TS1	45° 04.508'	67° 01.332'	-183	26	2200	7.42	15.9	15.9
TS2	45° 04.090'	67° 01.987'	-214	-5	1000	7.55	15.6	17.0
TS3	45° 04.000'	67° 02.639'	-161	48	250	7.50	15.5	16.3
TS4	45° 03.910'	67° 03.291'	No sample – sand / gravel bottom – 3 tries					14.9
TS5	45° 03.820'	67° 03.943'	No sample – sand / gravel bottom – 3 tries					
TS6	45° 03.730'	67° 04.596'	No sample – sand / gravel bottom – 3 tries					16.0
TS7	45° 03.640'	67° 05.248'	No sample – sand / gravel bottom – 3 tries					16.0
TS8	45° 03.550'	67° 05.900'	No sample – sand / gravel bottom – 3 tries					16.0

Table 8. Factor analysis ($p \leq 0.001$) for percentage of variance explained for various trace metals in sediments from Passamaquoddy Bay and Letang Inlet for samples (n=58) collected 7-17 September, 1999.

Factor	1 30.5%	2 11.7%	3 18.4%	4 6.25%	5 5.93%	6 6.41%	7 3.82%
<64um	0.72	*	*	*	*	*	*
As	*	*	*	*	*	*	0.68
Hg	*	*	*	*	*	*	*
Al%	0.83	*	*	*	*	*	*
Sb	*	*	*	*	*	*	0.66
Ba	0.64	*	*	*	*	*	*
Be	*	*	0.83	*	*	*	*
Bi	0.52	*	0.45	-0.54	*	*	*
Cd	*	0.94	*	*	*	*	*
Ca%	*	*	*	*	*	0.92	*
Ce	0.51	*	0.76	*	*	*	*
Cs	0.86	*	*	*	*	*	*
Cr	0.92	*	*	*	*	*	*
Co	0.96	*	*	*	*	*	*
Cu	*	0.71	*	*	*	*	*
Ga	0.80	*	0.50	*	*	*	*
Ge	0.69	*	*	*	*	*	*
Fe%	0.91	*	*	*	*	*	*
La	0.71	*	0.58	*	*	*	*
Pb	*	*	*	-0.64	*	*	*
Li	0.80	*	0.48	*	*	*	*
Mg%	0.88	*	*	*	*	*	*
Mn	*	*	*	-0.68	*	*	*
Mo	*	0.92	*	*	*	*	*
Ni	0.94	*	*	*	*	*	*
Nb	*	*	0.85	*	*	*	*
P	*	0.59	*	*	-0.59	*	*
K%	0.50	*	*	*	*	*	*
Rb	0.43	*	0.75	*	*	*	*
Ag	*	*	0.72*	*	*	*	*
Na%	*	*	*	*	-0.87	*	*
Sr	*	*	*	*	*	0.91	*
Ta	*	*	0.87	*	*	*	*
Te	0.58	*	*	-0.50	*	0.71	*
Tl	*	0.64	0.50	*	*	*	*
Th	*	*	0.76	*	*	*	*
Ti	0.58	*	0.50	*	*	*	*
W	*	*	0.77	*	*	*	*
U	*	0.84	*	*	*	*	*
V	0.91	*	*	*	*	*	*
Y	*	*	0.49	*	*	*	*
Zn	0.62	0.62	*	*	*	*	*

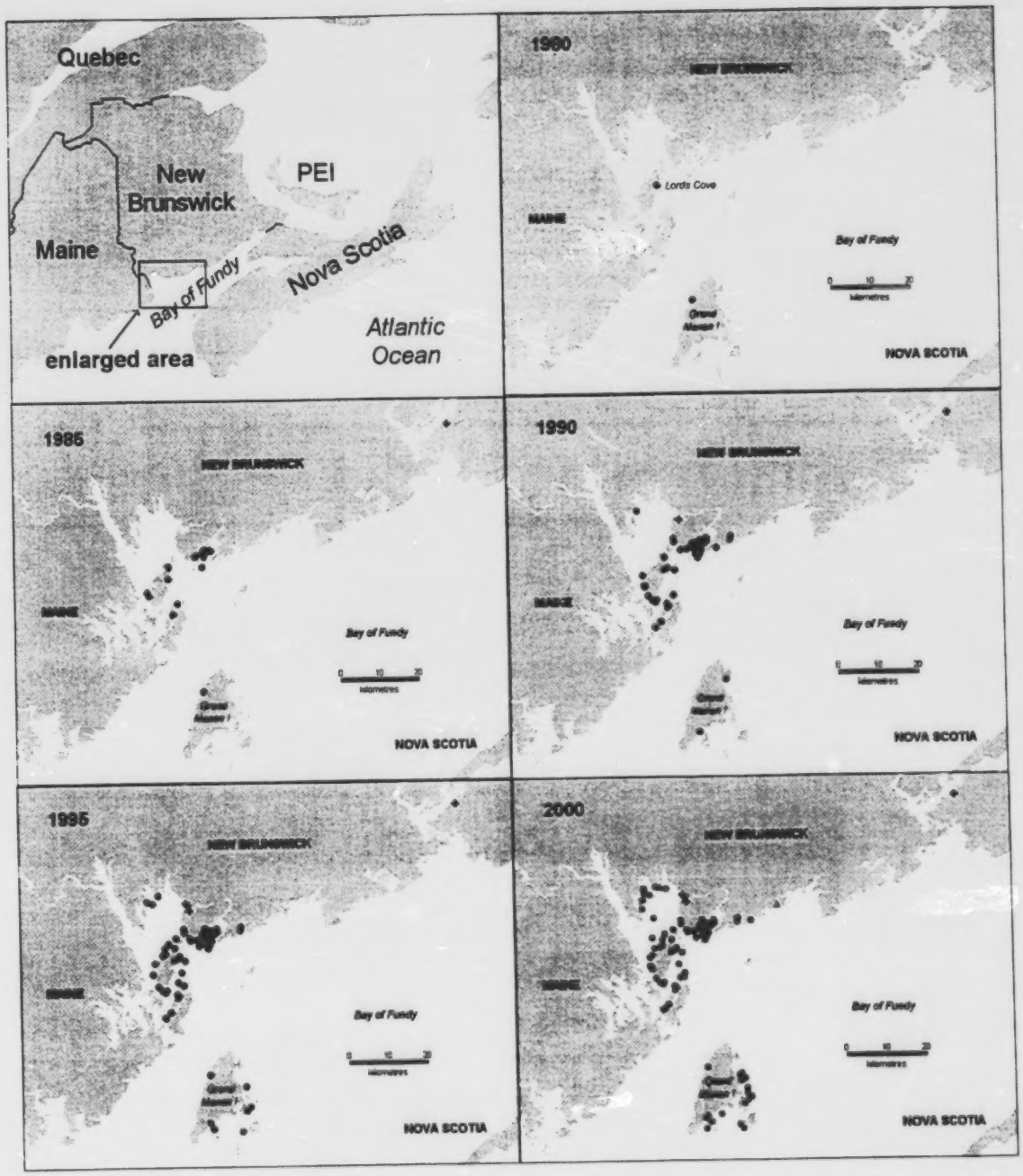

Fig. 1. Distribution of salmon aquaculture license sites in southwestern New Brunswick (SWNB) from 1980 to 2000, Data provided by the New Brunswick Department of Fisheries and Aquaculture (courtesy B. Chang).

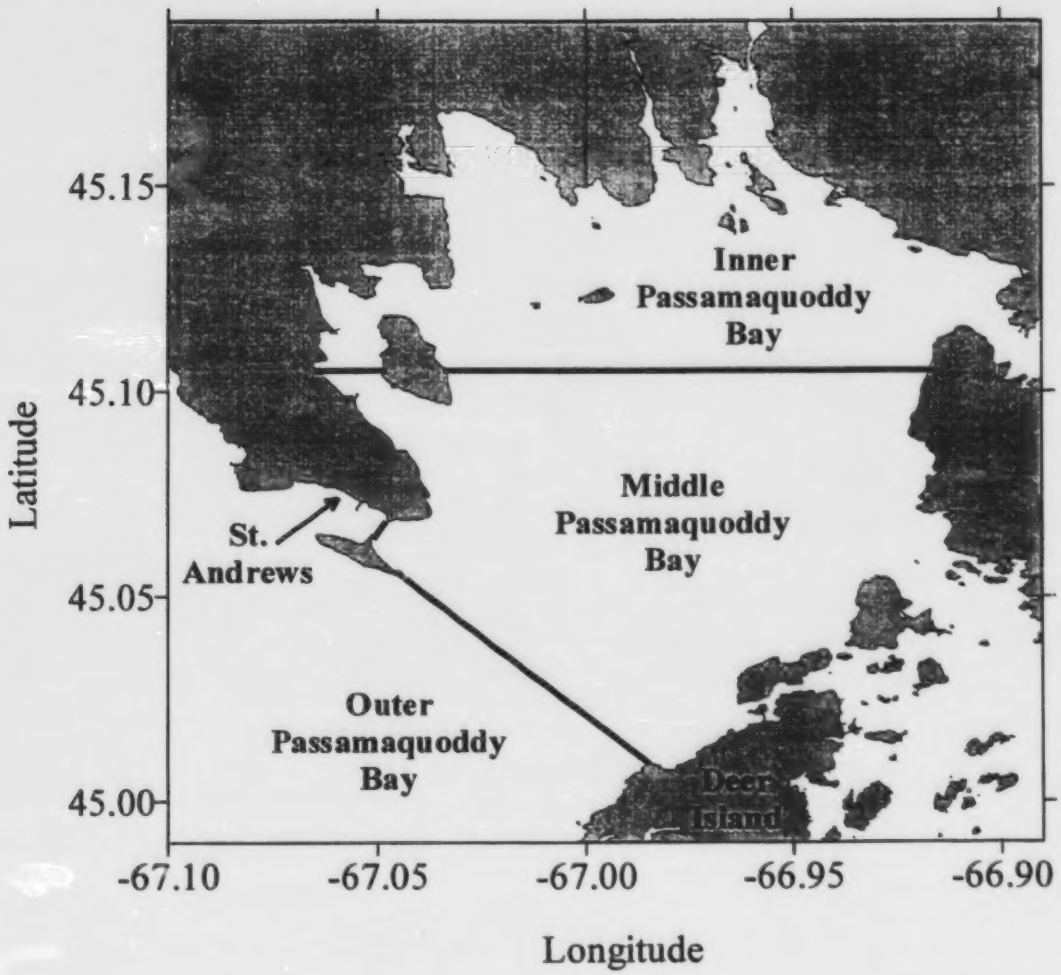

Fig. 2. Map of Passamaquoddy Bay indicating the designated hydrographic areas.

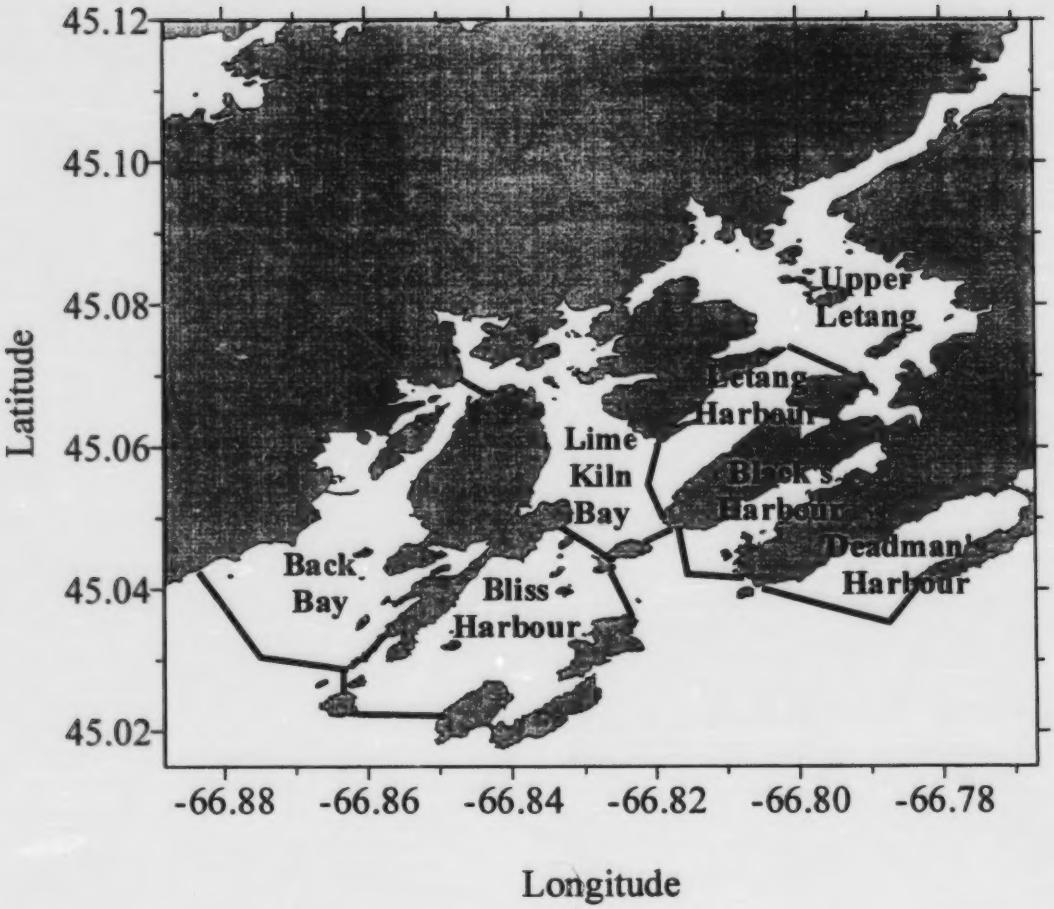

Fig. 3. Map of Letang Inlet indicating the designated hydrographic areas outlined in Fig. 3 and referred to in Tables 1 and 3.

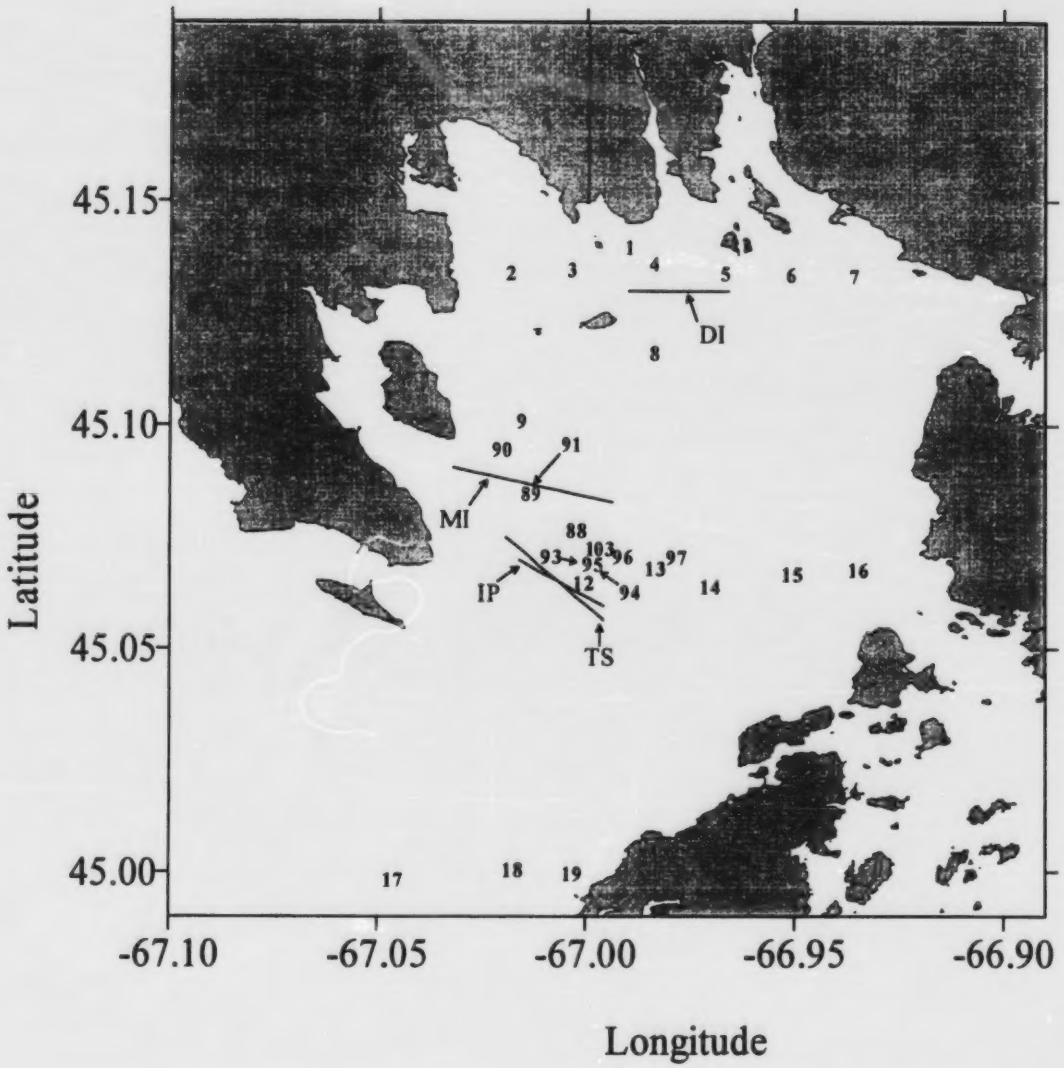

Fig. 4. Transect stations for water and sediment samples in Passamaquoddy Bay, September 7-17, 1999. DI – Dick's Island, IP – Indian Point, MI – Ministers Island, TS – Tongue Shoal.

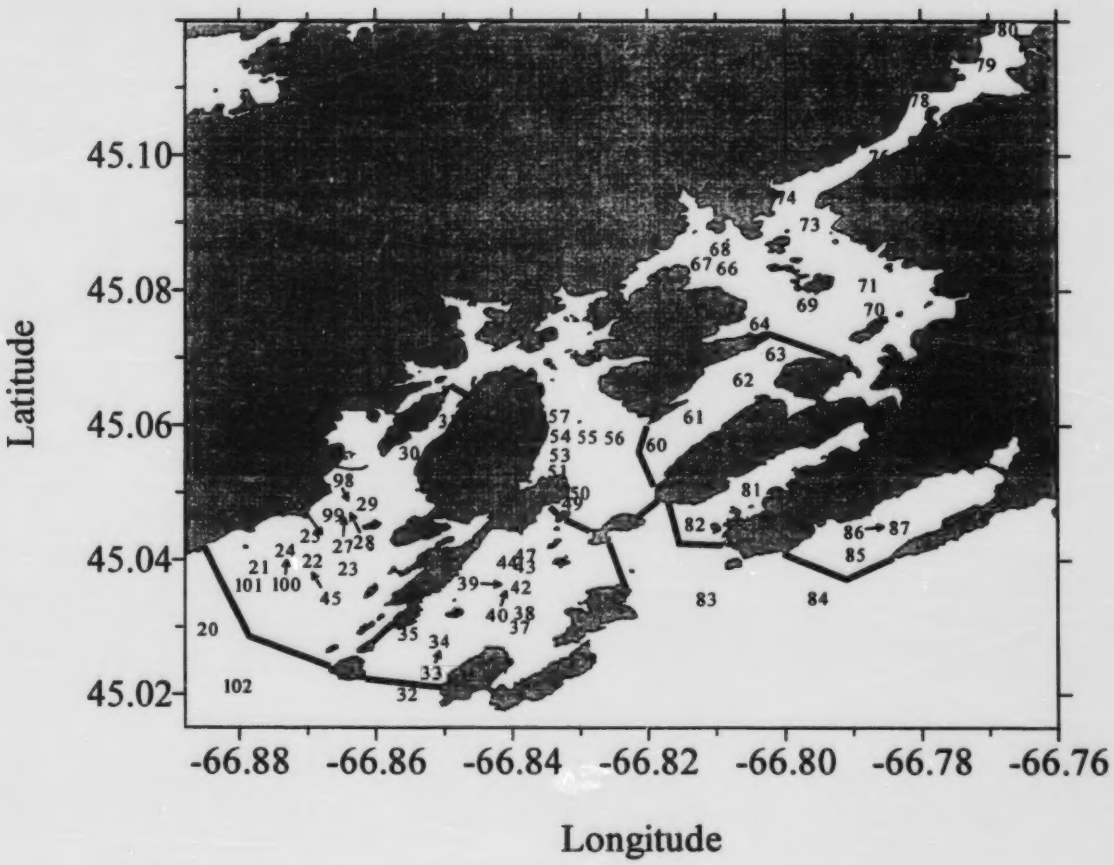

Fig. 5. Station locations for water and sediment samples in the Letang Inlet and adjacent areas 7-17 September, 1999. Lines indicate separation of hyrographic sub-regions named in Figs. 4 and 5 and in Table 1 for reporting mean values for variables from different areas.

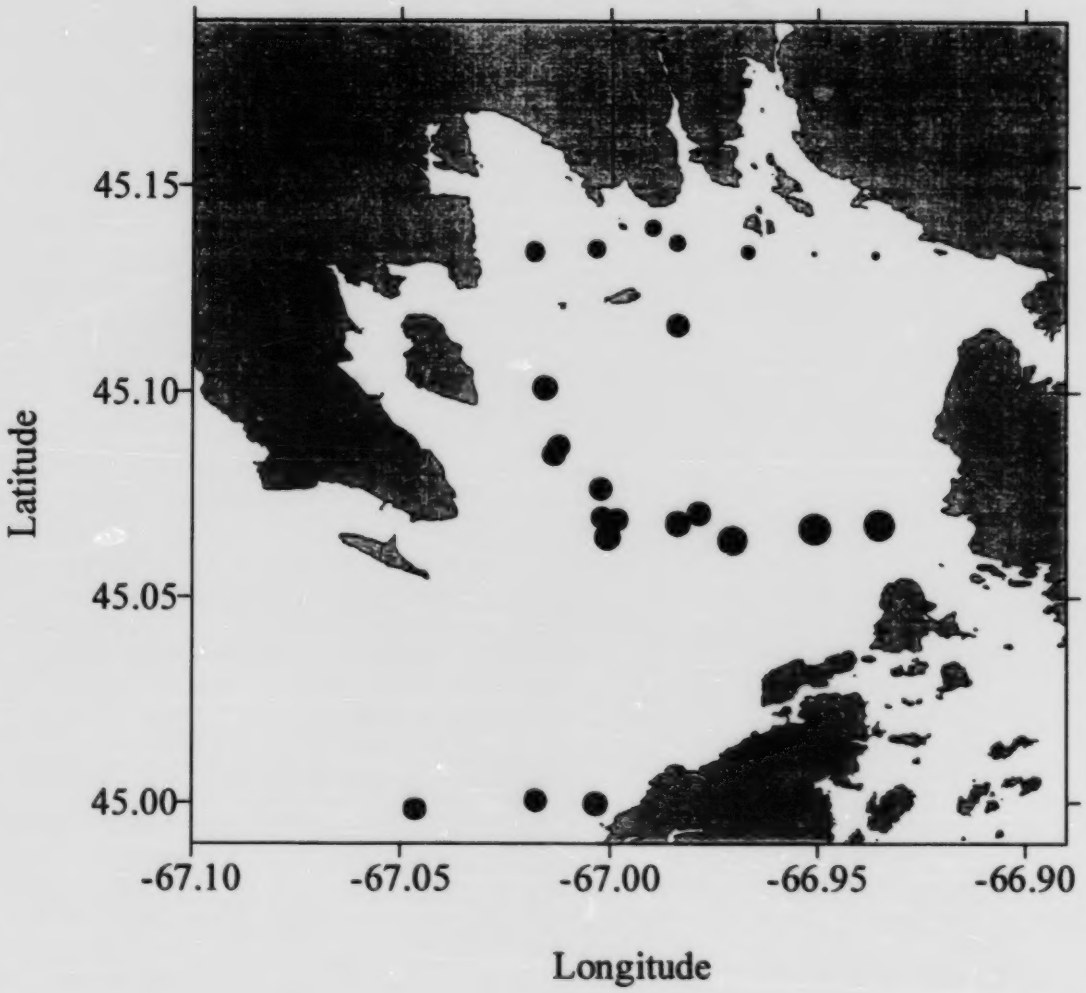

Fig. 6. Salinity at 2 m depth in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the salinity. Largest symbol – 32.359. Smallest symbol – 31.040.

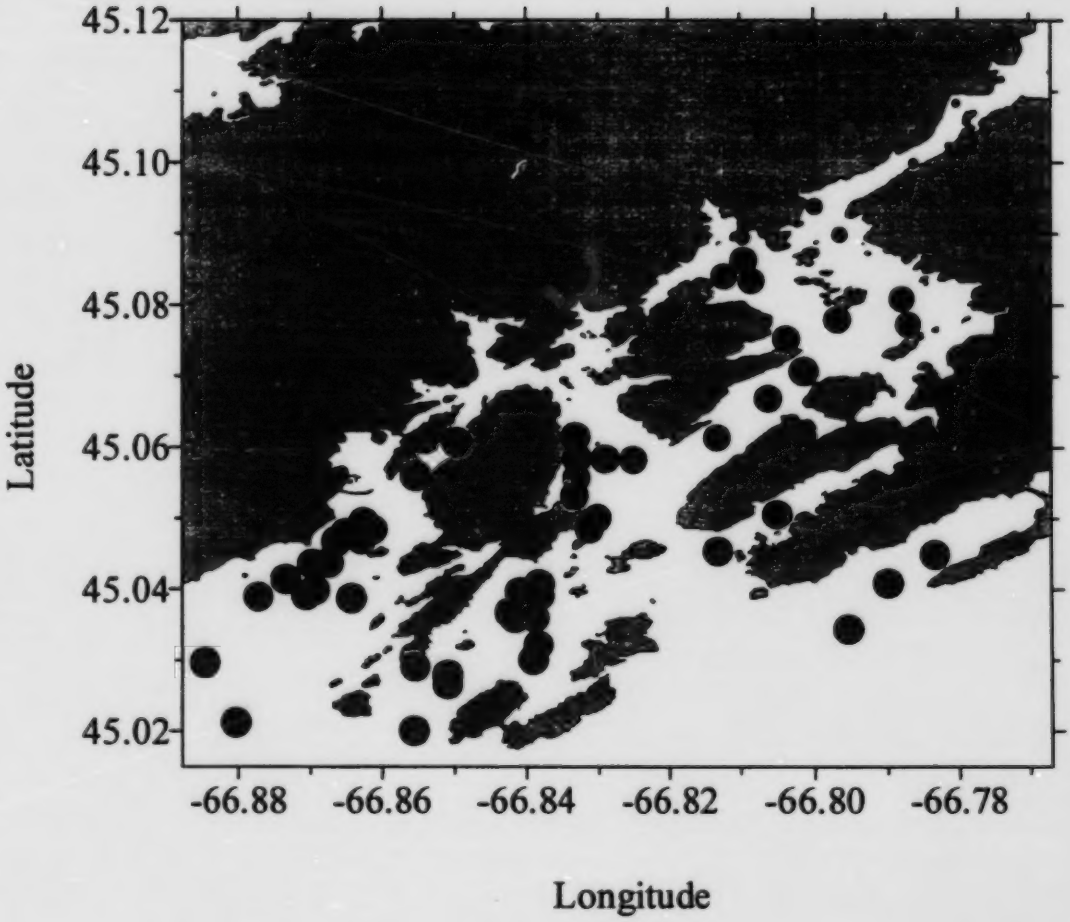

Fig. 7. Salinity at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the salinity: Largest symbol = 32.432; smallest symbol = 31.149.

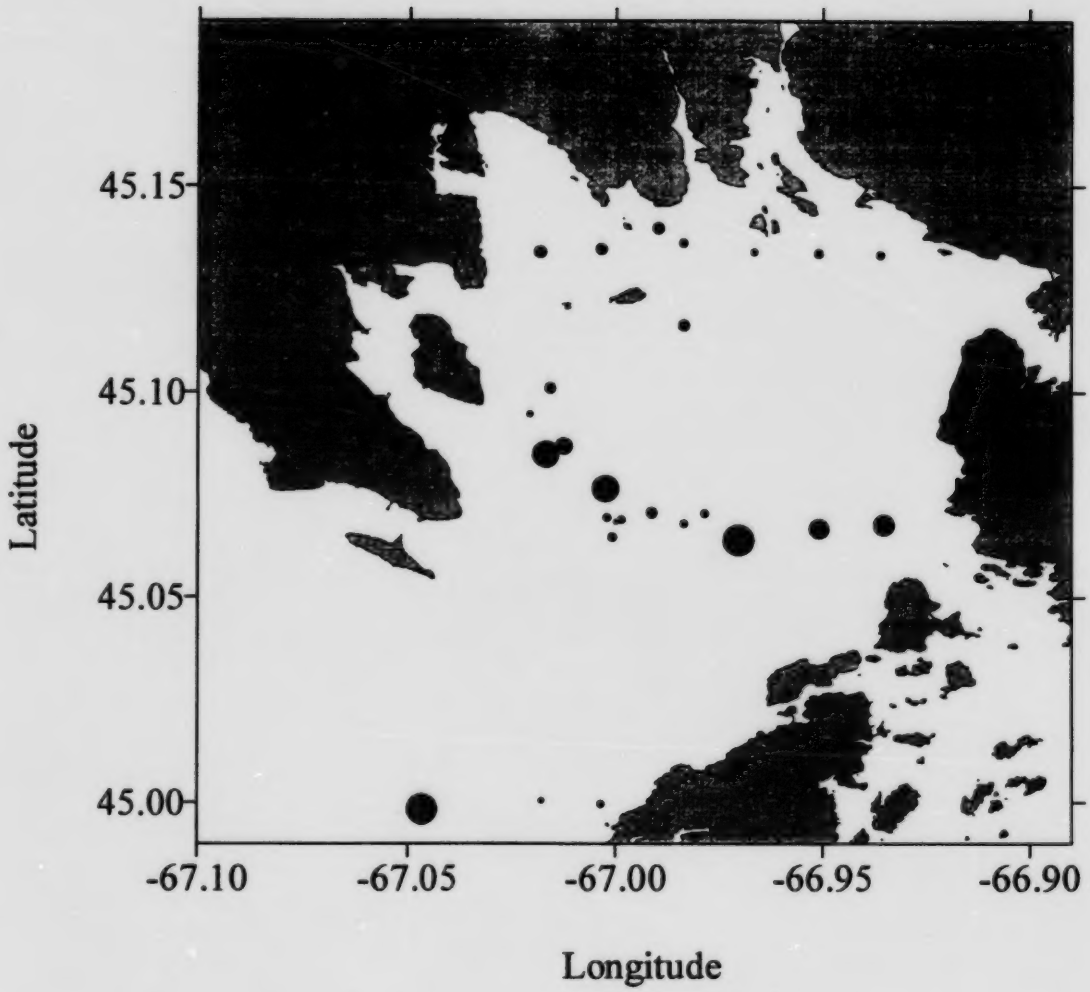

Fig. 8. Concentrations of ammonia (NH_3) at 2m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of NH_3: Largest symbol = 3.2 μM; smallest symbol = 1.3 μM.

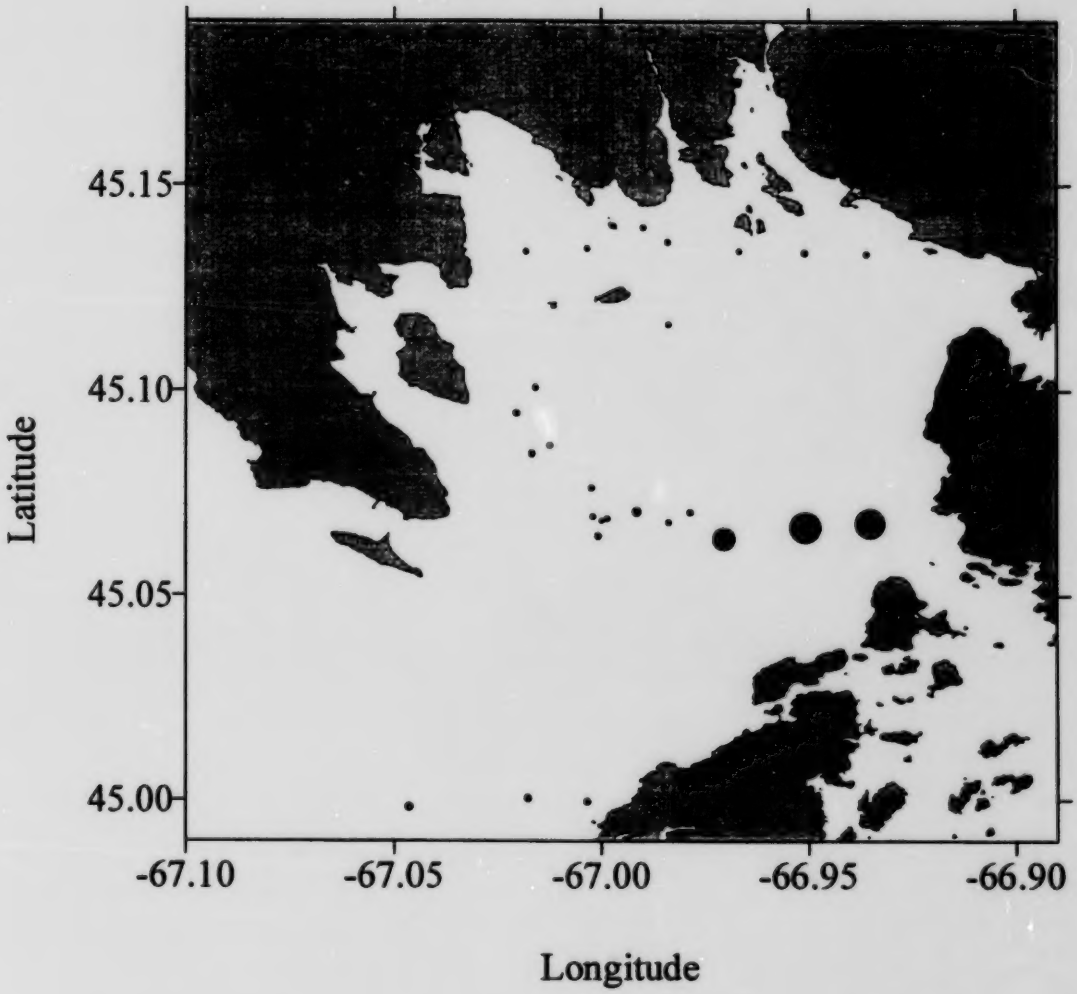

Fig. 9. Concentrations of nitrate (NO_3^-) at 2m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of NO_3^-: Largest Symbol = 2.7 μM; smallest symbol = 0.2 μM.

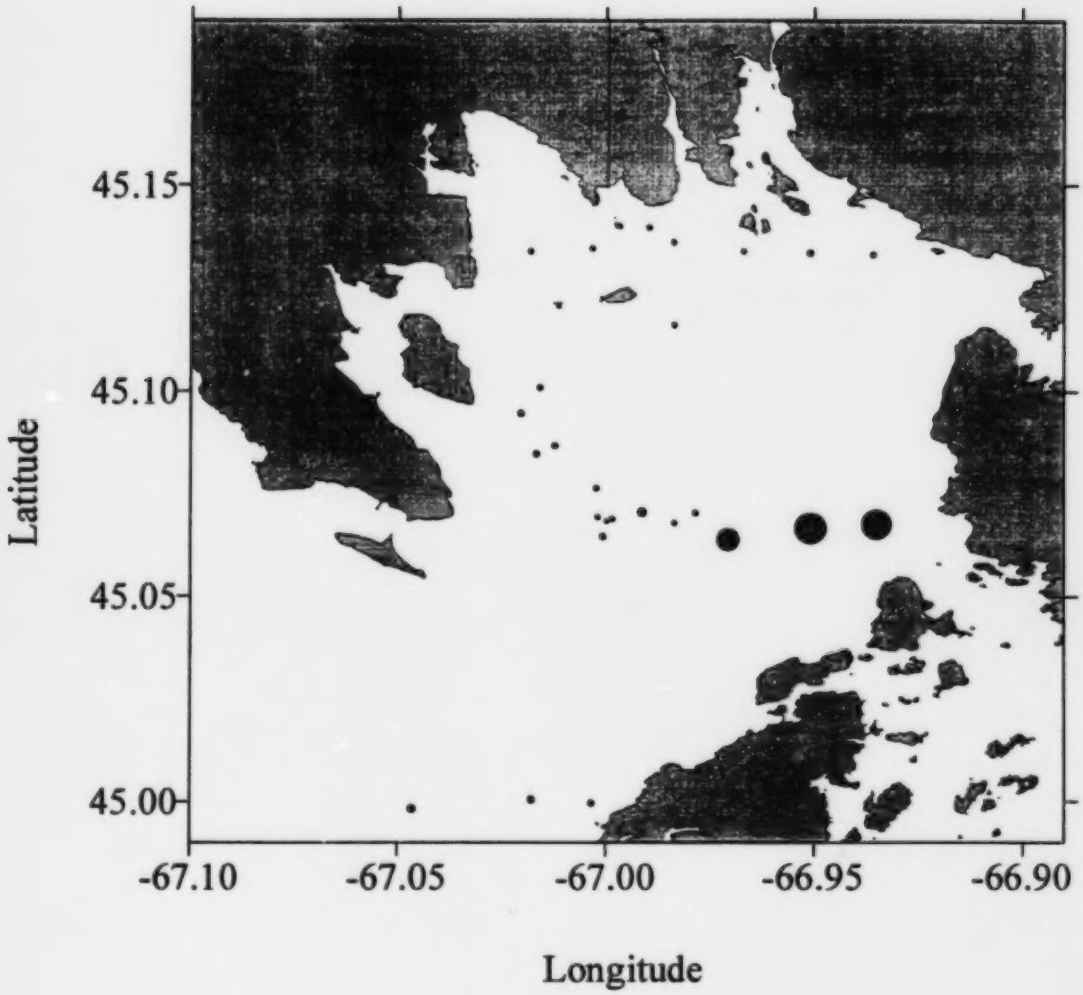

Fig. 10. Concentrations of nitrite (NO_2^-) at 2m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of NO_2^-. Largest symbol = 0.18 µM; smallest symbol = 0.03 µM.

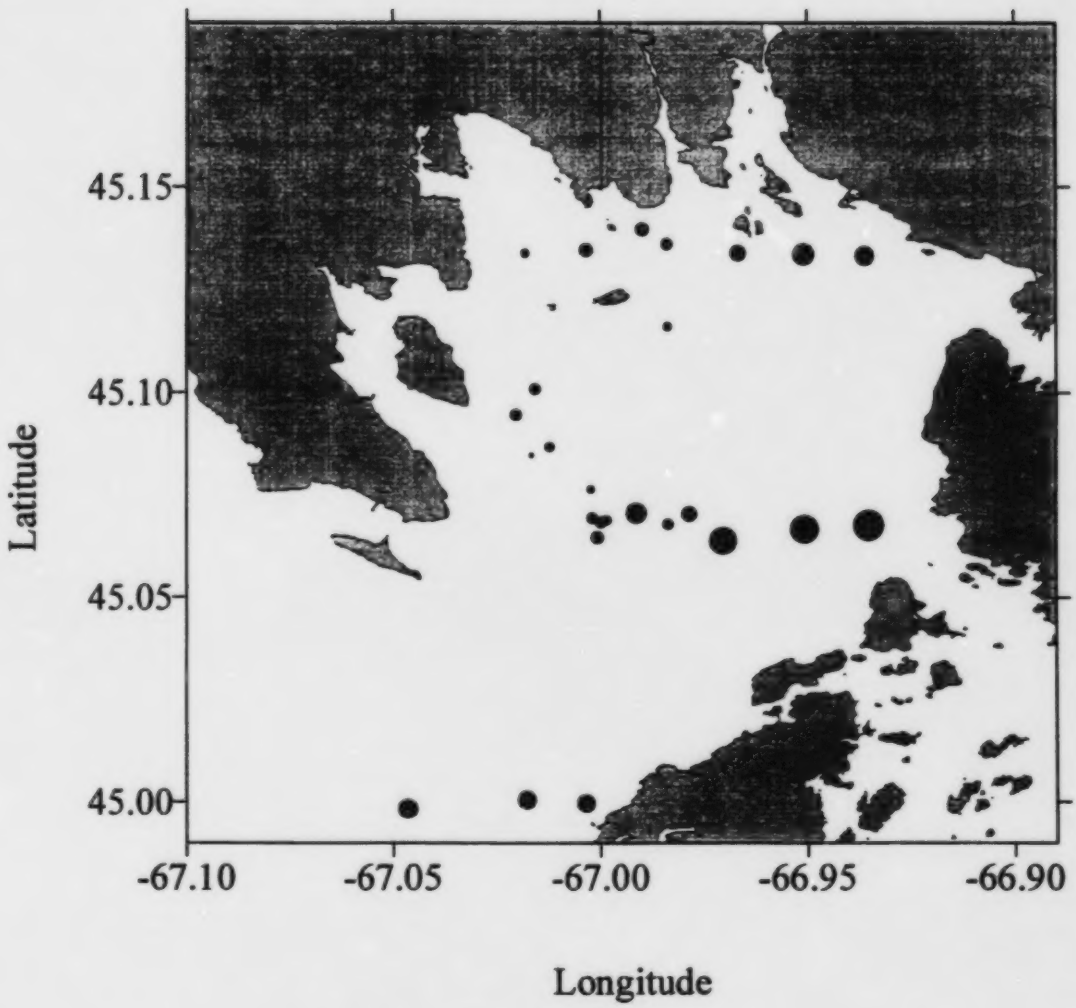

Fig. 11. Concentrations of phosphate ($PO_4^{\equiv}$) at 2m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of $PO_4^{\equiv}$: Largest symbol = 0.72 µM; smallest symbol = 0.32 µM.

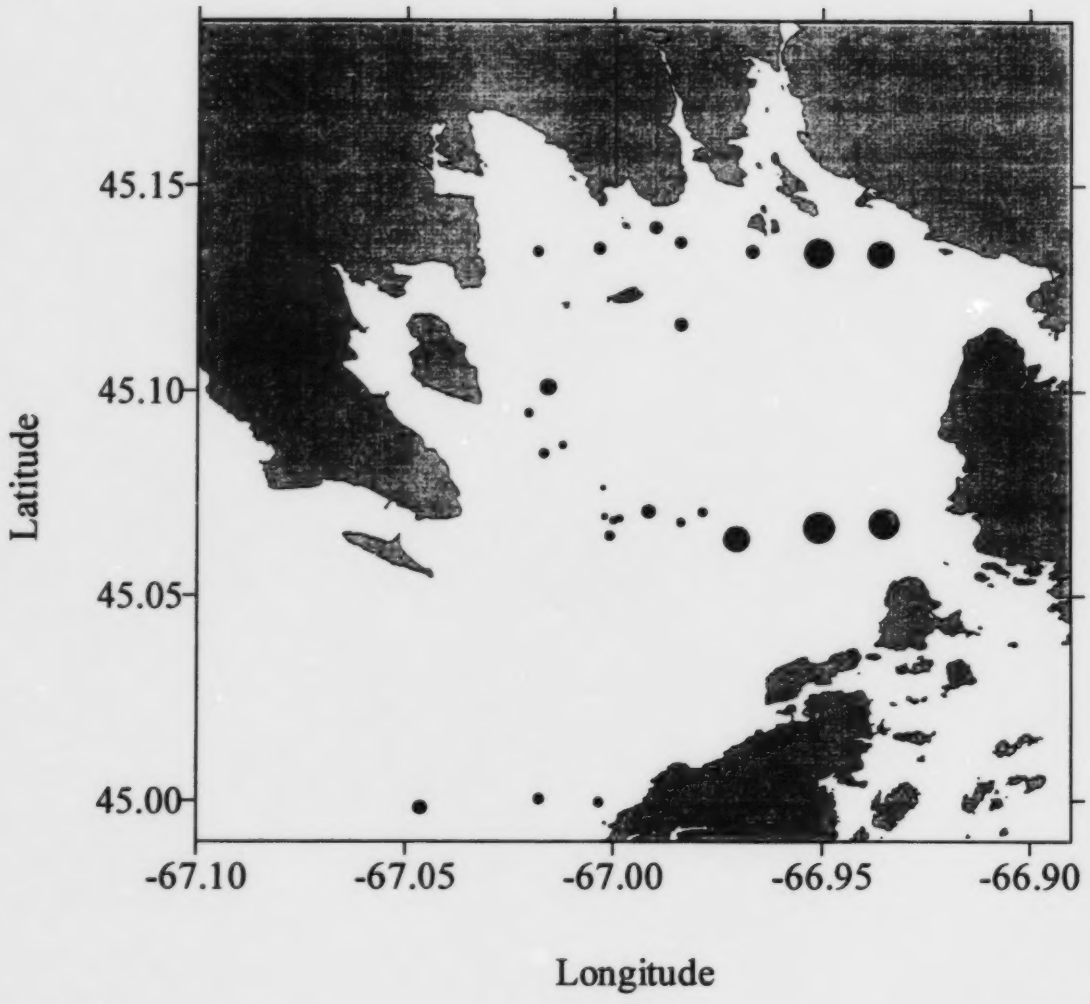

Fig. 12. Concentrations of silicate at 2m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of silicate: Largest symbol = 3.4 μM; smallest symbol = 0.72 μM.

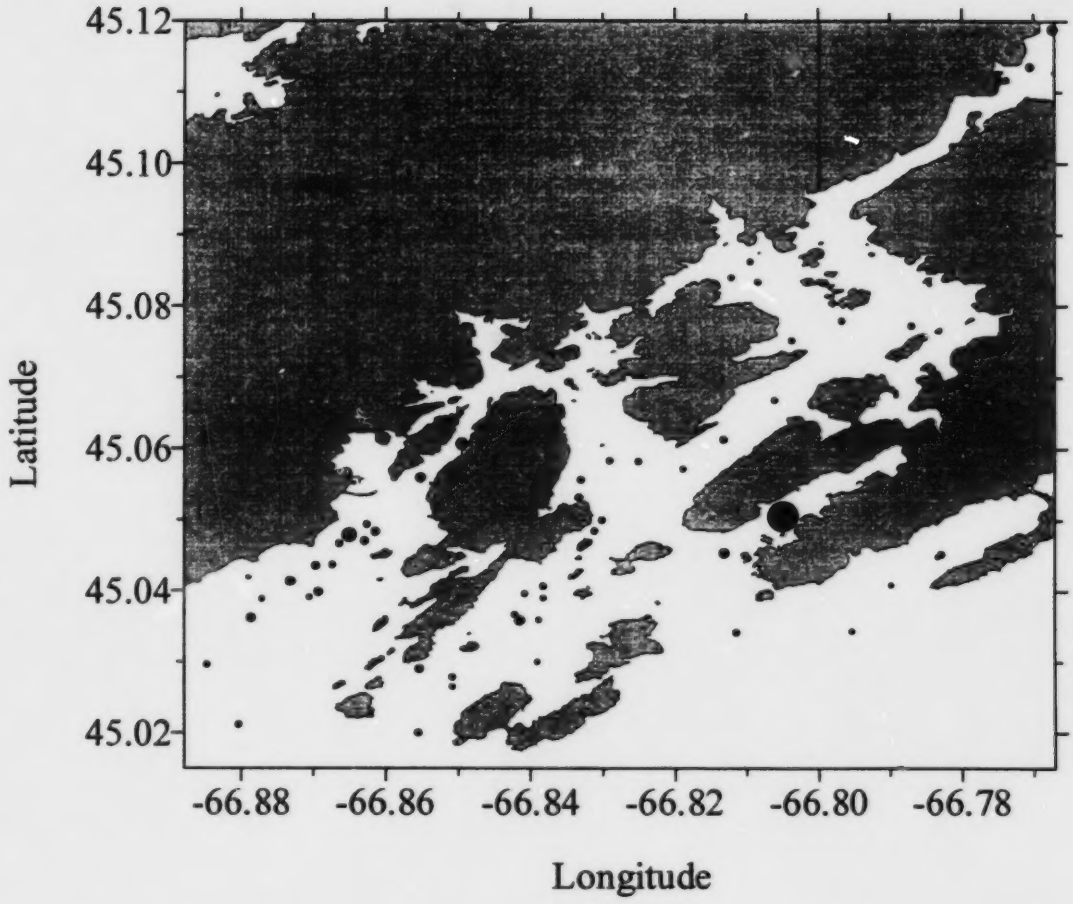

Fig. 13. Ammonia (NH_3) concentrations at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of NH_3: Largest symbol = 21.1 μM; smallest symbol = 1.1 μM.

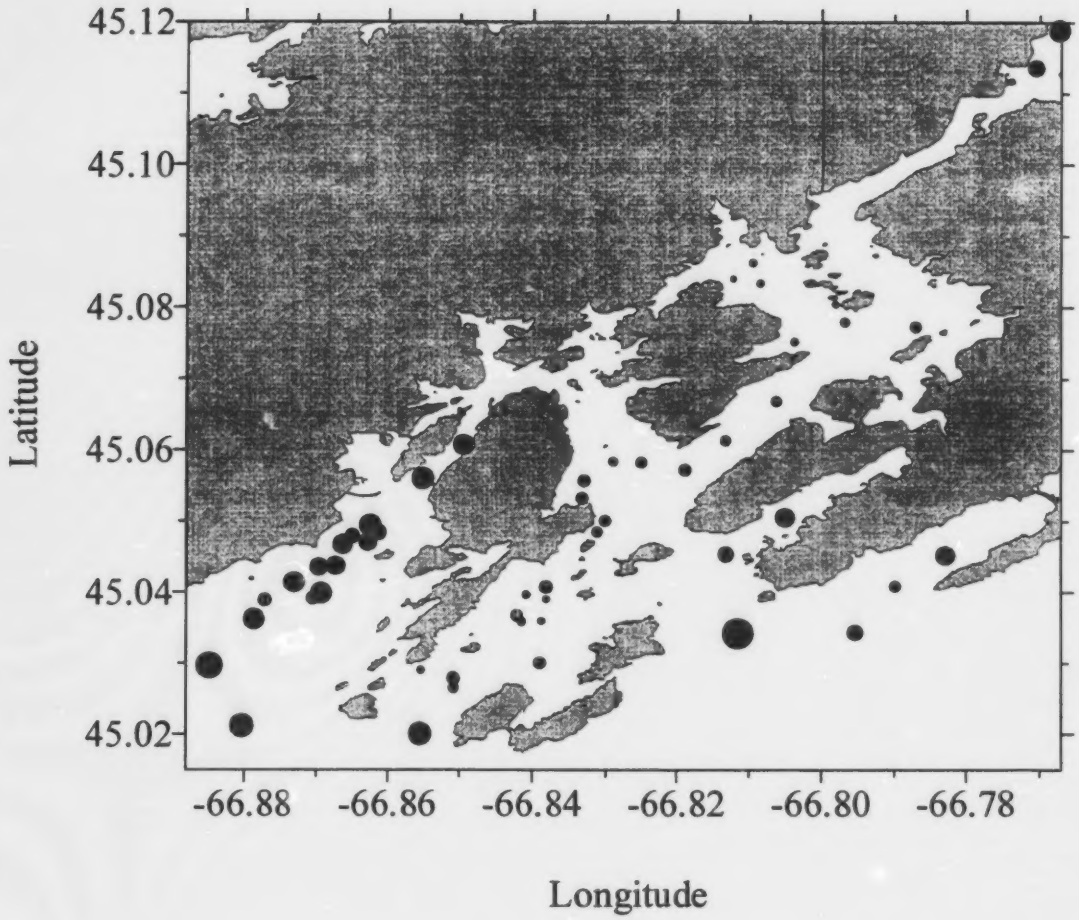

Fig. 14. Nitrate (NO_3^-) concentrations at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of NO_3^-: Largest symbol = 3.8 µM; smallest symbol = 0.2 µM.

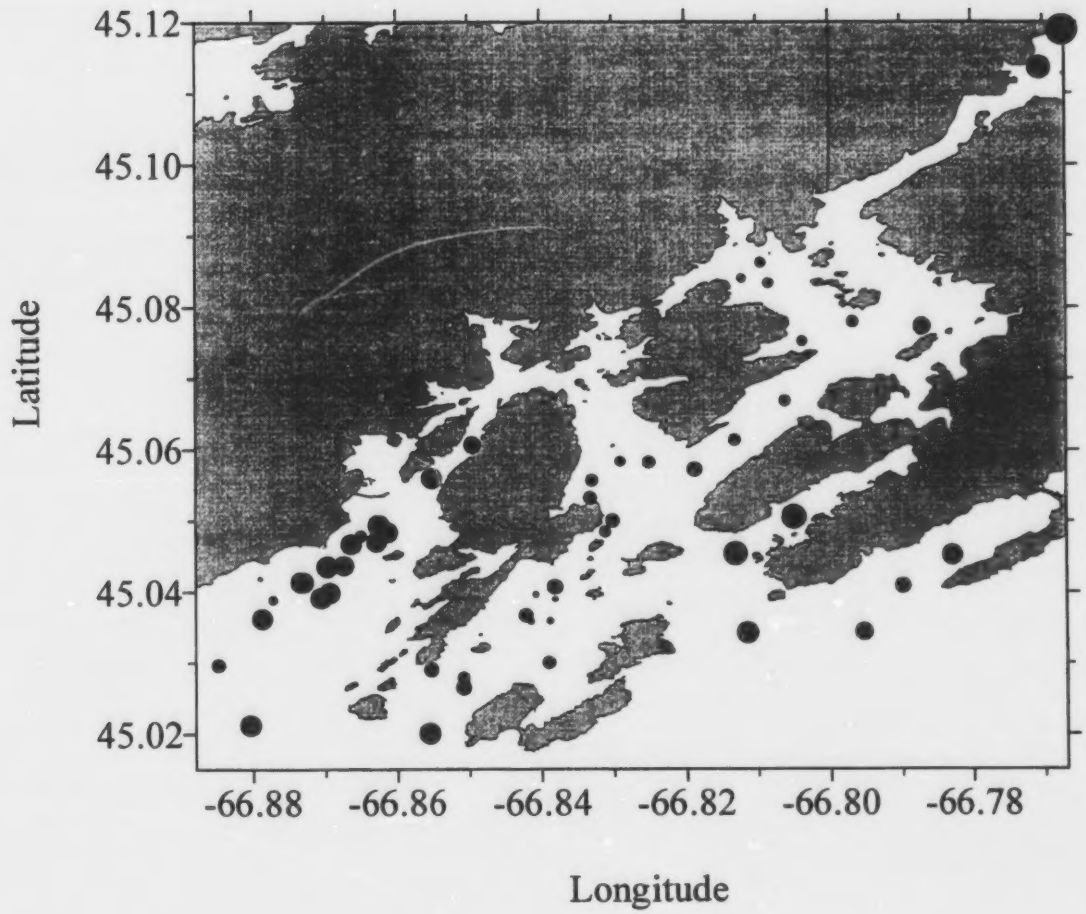

Fig. 15. Nitrite (NO_2^-) concentrations at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of NO_2^-. Largest symbol = 0.45 µM; smallest symbol = 0.03 µM.

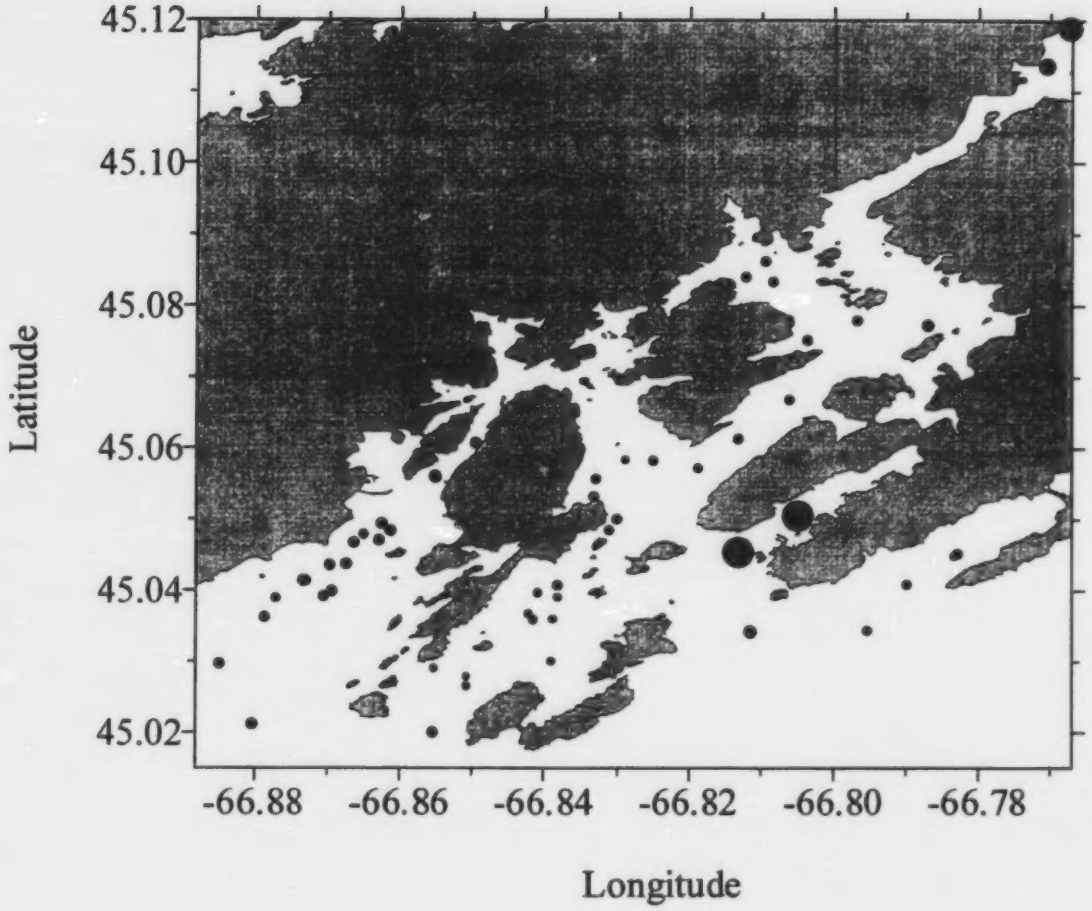

Fig. 16. Phosphate ($PO_4^{\equiv}$) concentrations at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of $PO_4^{\equiv}$. Largest symbol = 2.1 μM; smallest symbol = 0.3 μM.

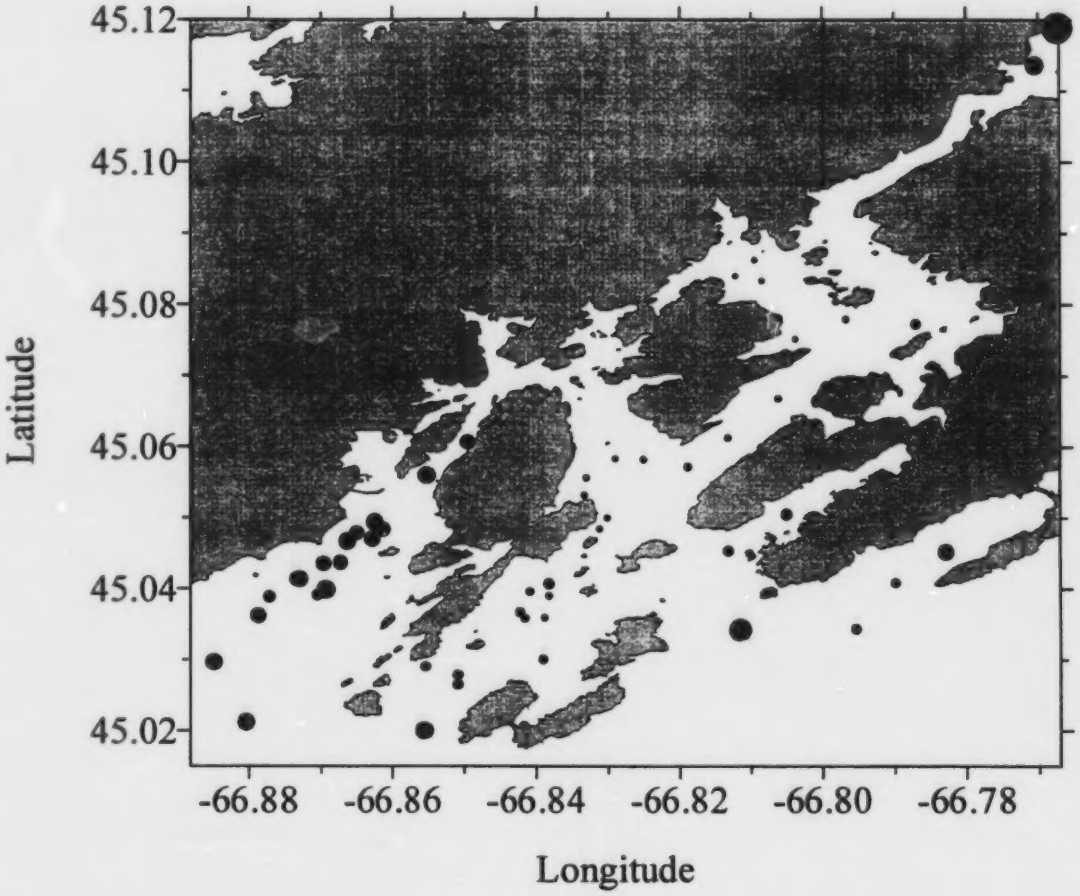

Fig. 17. Silicate concentrations at 2 m in the Letang Inlet 7-17 September, 1999. Note: the size of the symbol is proportional to the silicate concentration: Largest symbol = 6.7 μM; smallest symbol = 0.7 μM.

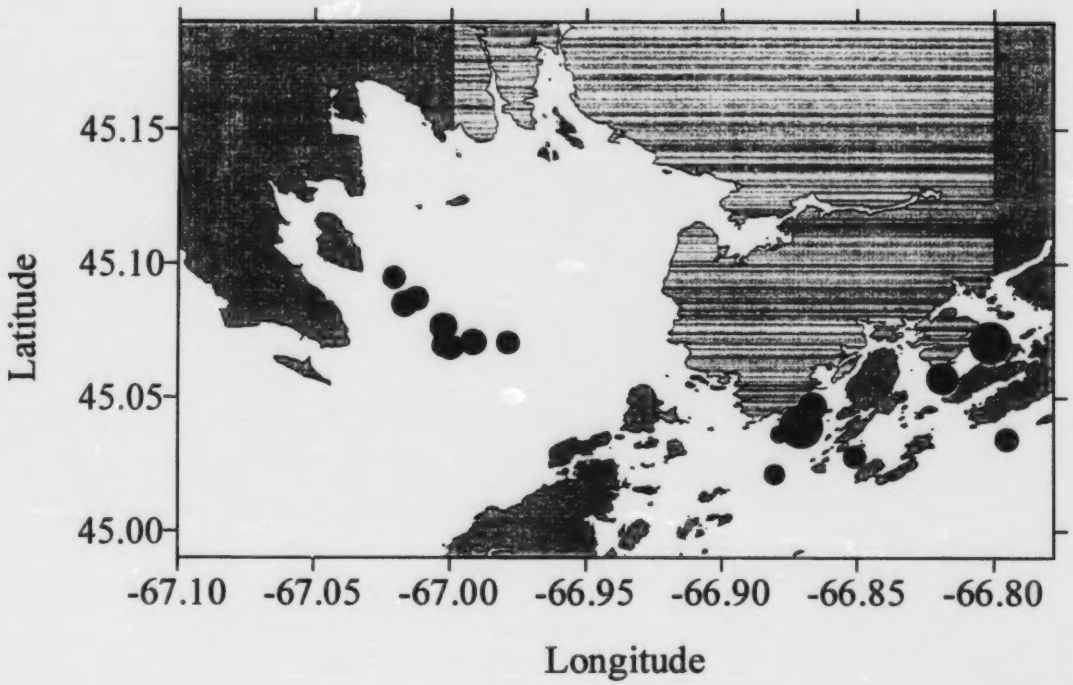

Fig. 18. Copper (Cu) concentrations at 2 m in Passamaquoddy Bay/Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of Cu: Largest symbol = 0.36 ug l^{-1}; smallest symbol = 0.19 $\mu g\ l^{-1}$.

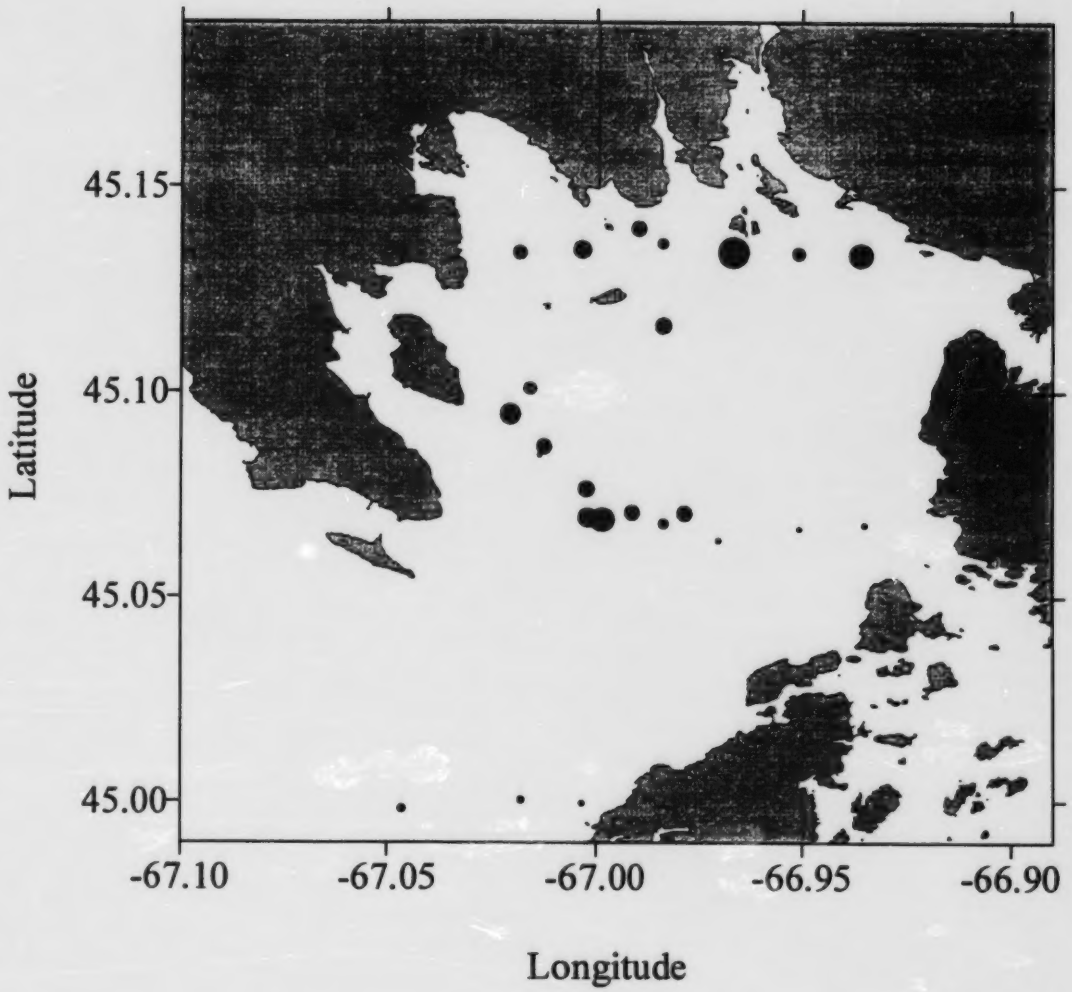

Fig. 19. Dissolved organic carbon (DOC) concentration at 2 m in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the concentration of DOC: Largest symbol = 219 μM C; smallest symbol = 68 μM C.

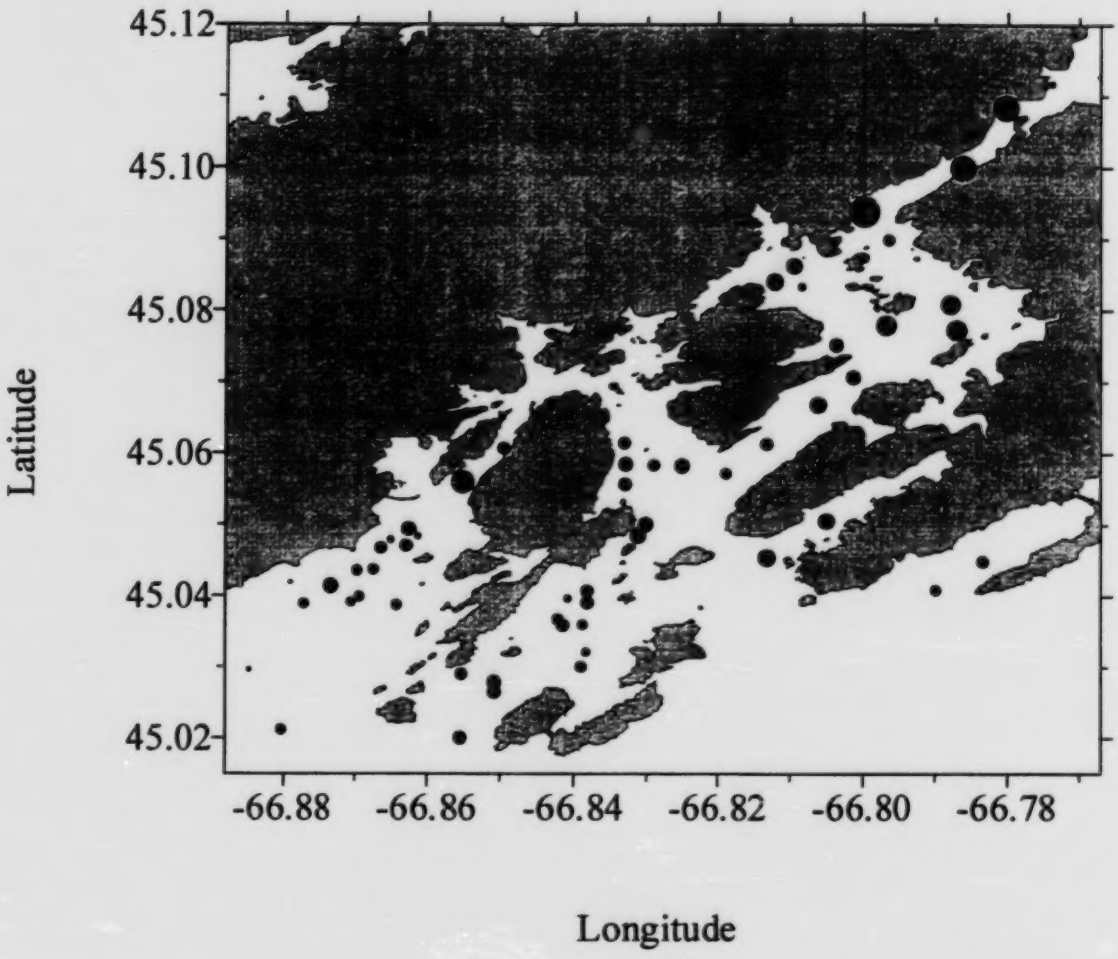

Fig. 20. Dissolved organic carbon (DOC) concentration at 2 m in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the concentration of DOC: Largest symbol = 420 µM C; smallest symbol = 63 µM C.

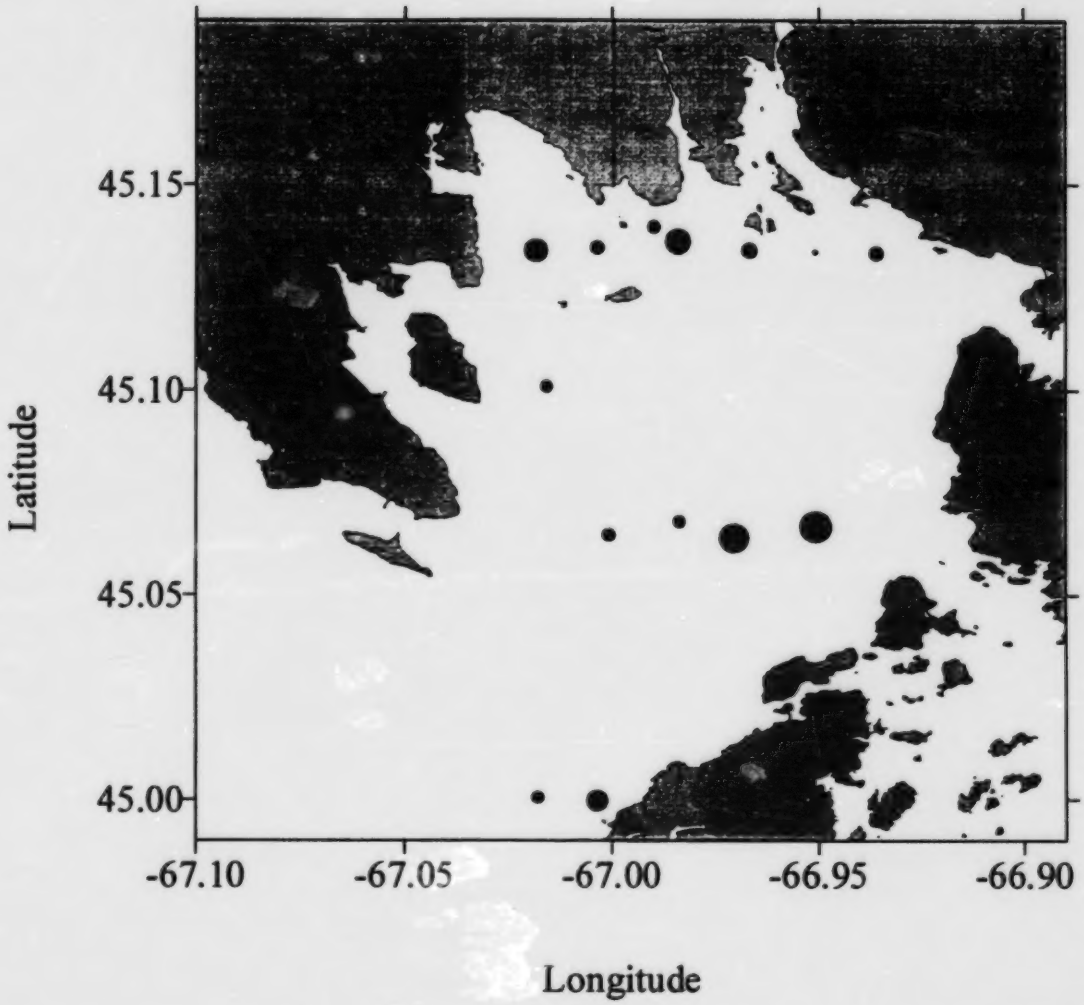

Fig. 21. Redox potentials (Eh as mV NHE) in surface (0-2 cm) sediments in Passamaquoddy Bay 7-17 September, 1999. Largest symbol is +64 mV; smallest symbol is -23 mV.

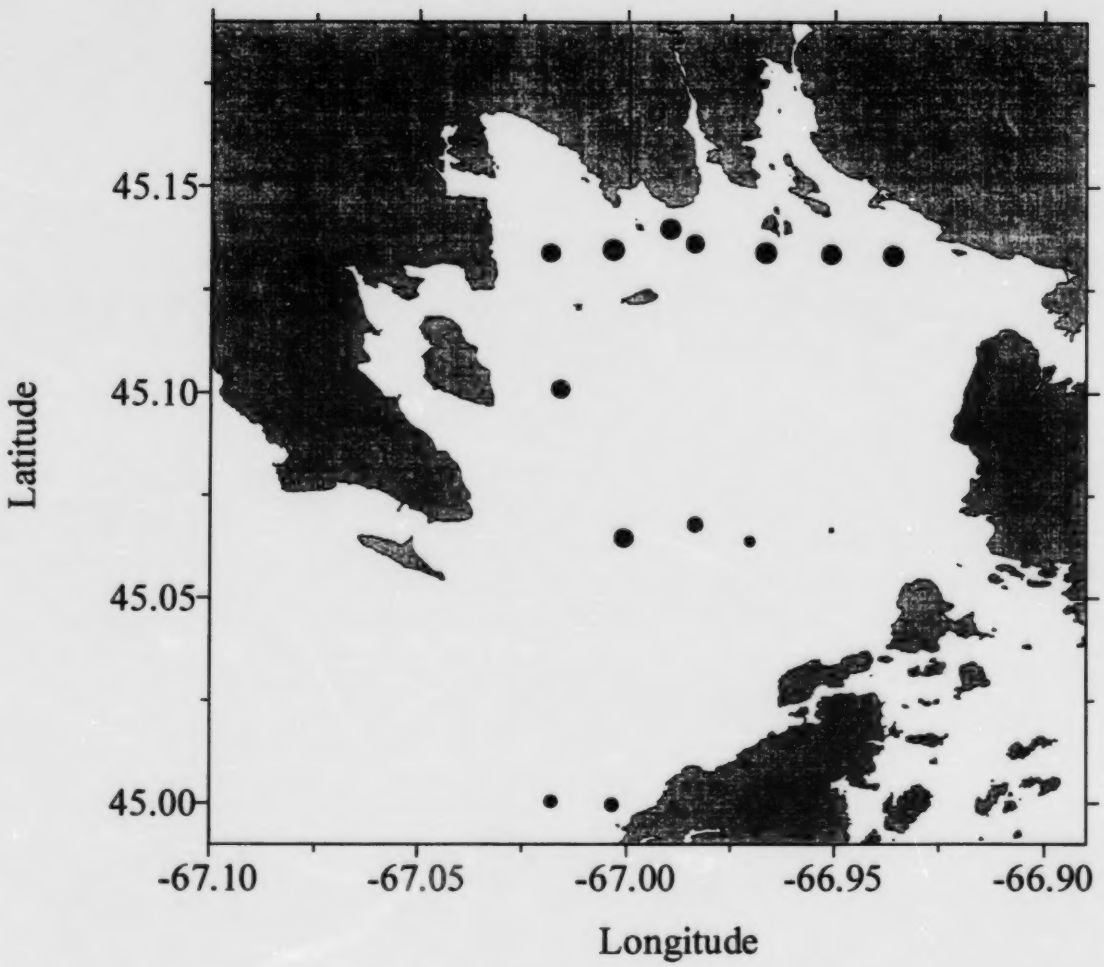

Fig. 22. Log_{10} values for total sulfide ($S^{=}$) concentration in surface (0-2 cm) sediments of Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to log_{10} concentration of $S^{=}$ (μM): Largest symbol = 3.58 (3800 μM); smallest symbol = 1.18 (15 μM).

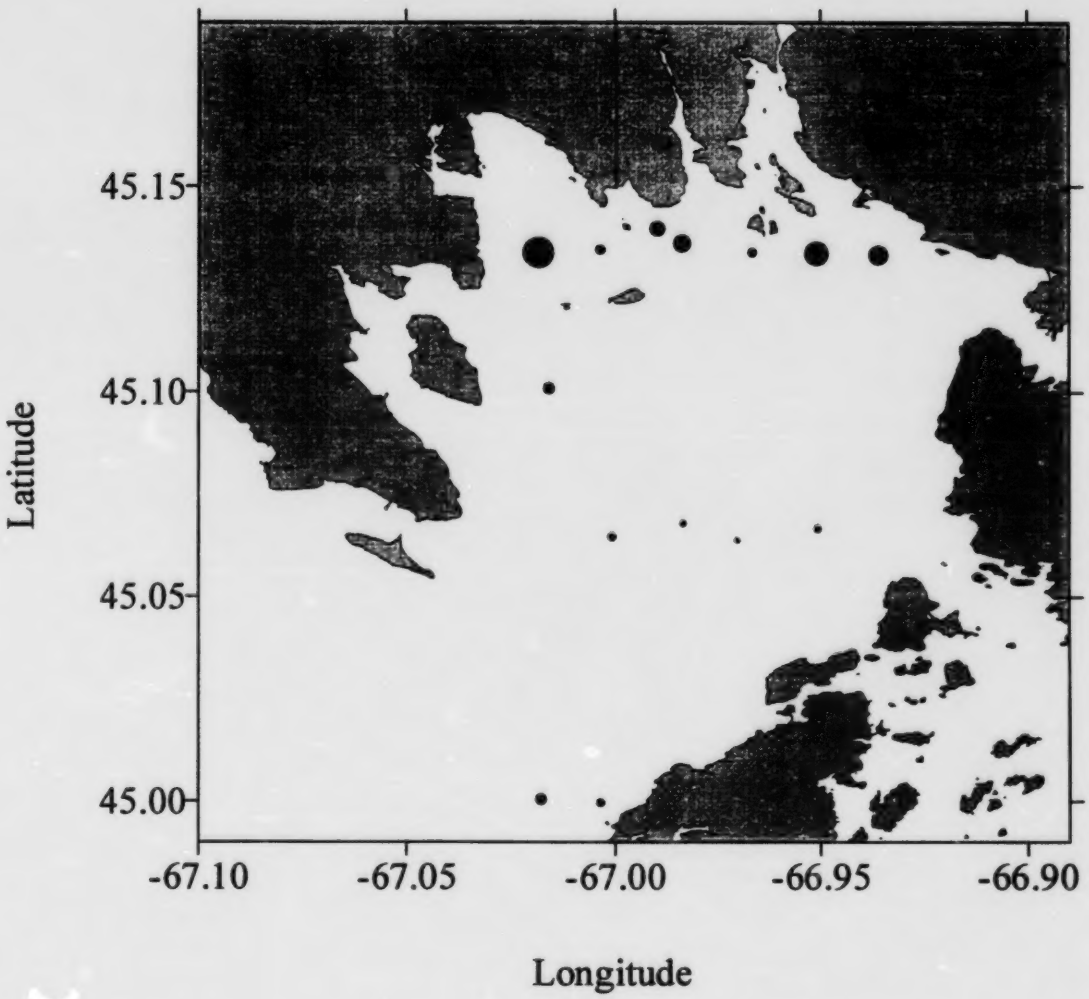

Fig. 23. Temperature of surface (0-2 cm) sediments in Passamaquoddy Bay 7-17 September. 1999. The size of the symbol is proportional to temperature (^{o} C): Largest symbol = 17.6^{o} C; smallest symbol = 13.7^{o} C.

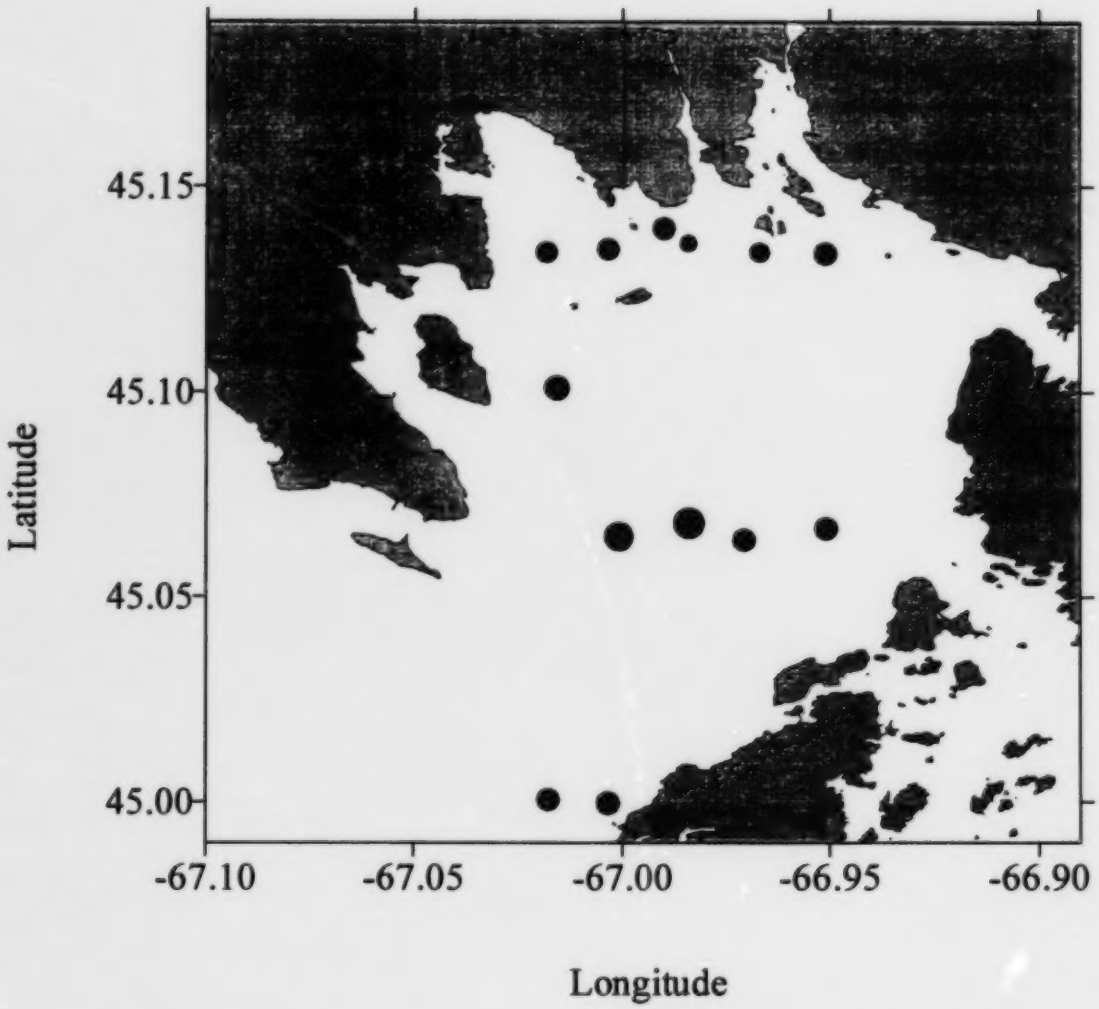

Fig. 24. pH in surface (0-2 cm) sediments of Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the pH: Largest symbol = 7.50; smallest symbol = 6.32.

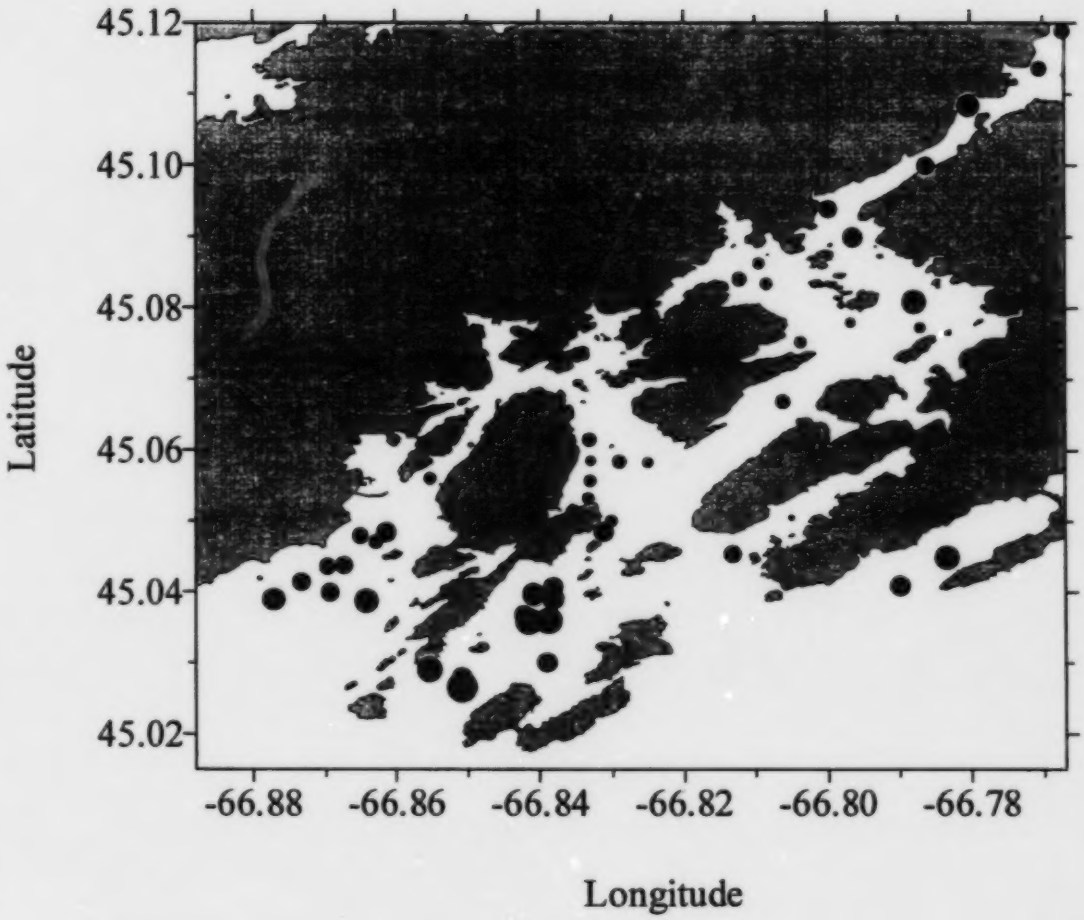

Fig. 25. Redox potentials (Eh) (NHE mV) in surface (0-2 cm) sediments in the Letang Inlet 7-17 September, 1999. Largest symbol equivalent to a potential of +60 mV; smallest symbol equivalent to a potential of -124 mV.

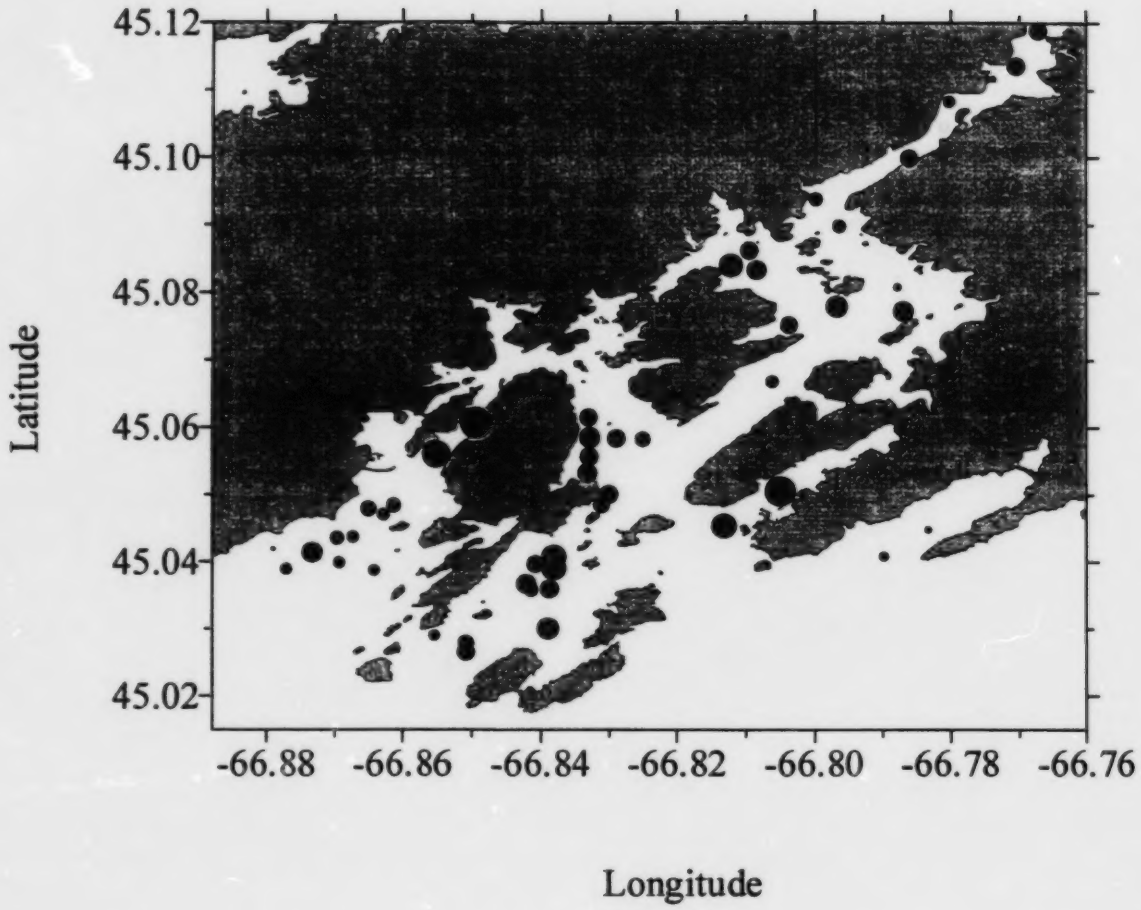

Fig. 26. Log_{10} sulfide ($S^{=}$) in surface (0-2 cm) sediments of the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the log_{10} concentration of $S^{=}$ (μM): Largest symbol = 5.28 (190000 μM); smallest symbol = 1.46 (29 μM).

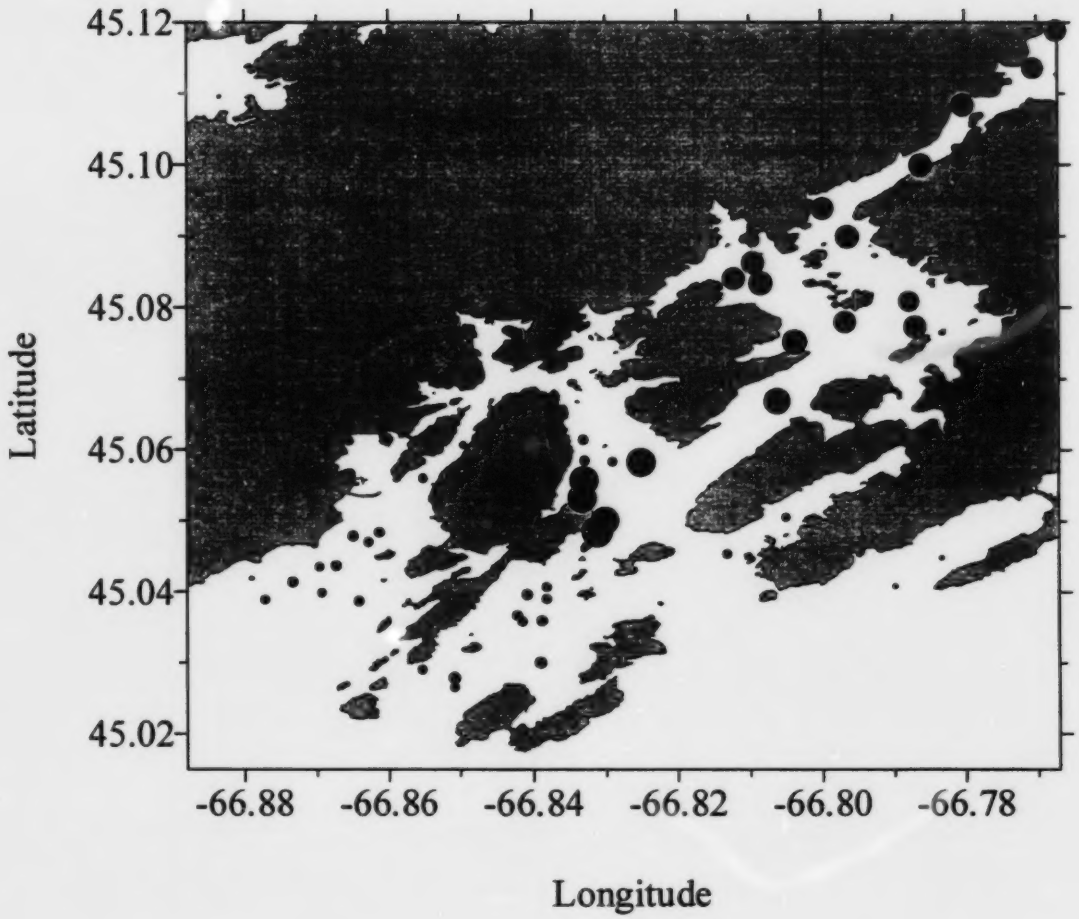

Fig. 27. Temperature of surface (0-2 cm) sediments in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to temperature (°C): Largest symbol = 18.3° C; smallest symbol = 12.3° C.

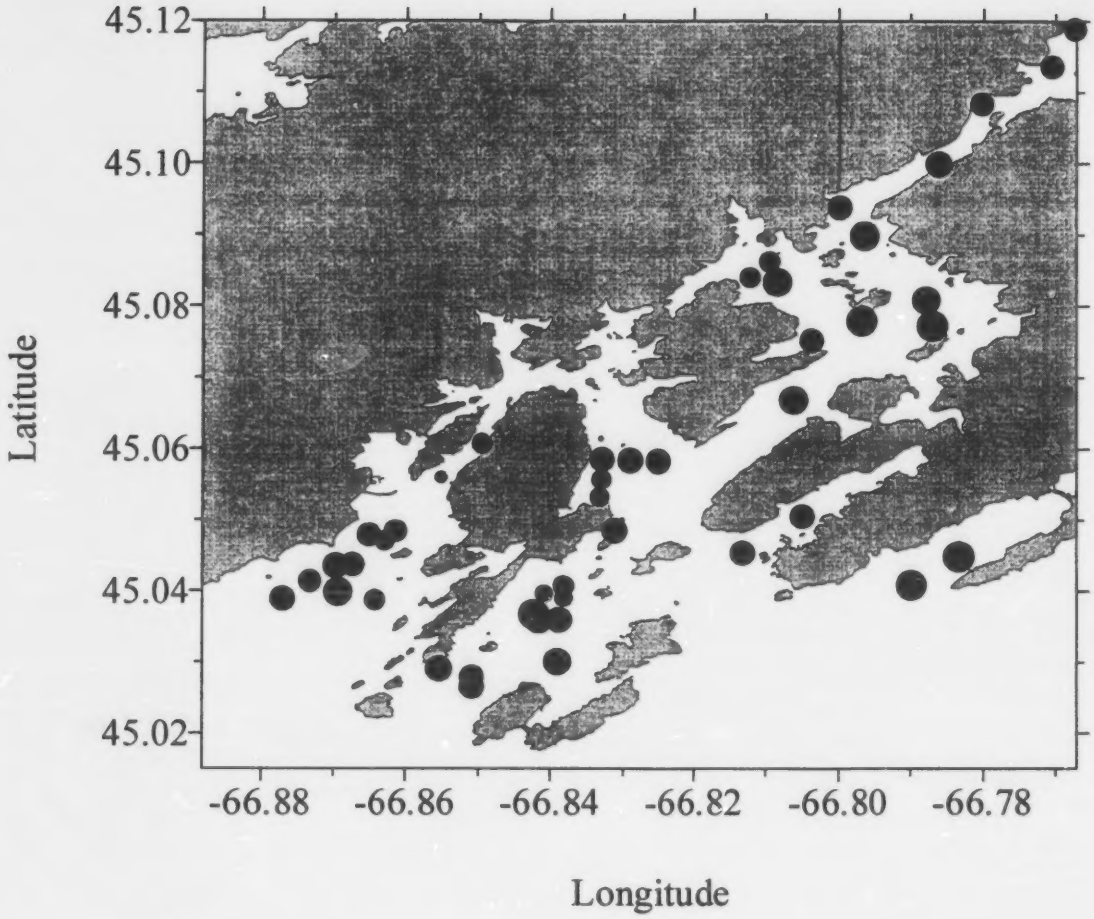

Fig. 28. pH in surface (0-2 cm) sediments of the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the pH of the sediment: Largest symbol = 7.52; smallest symbol = 5.97.

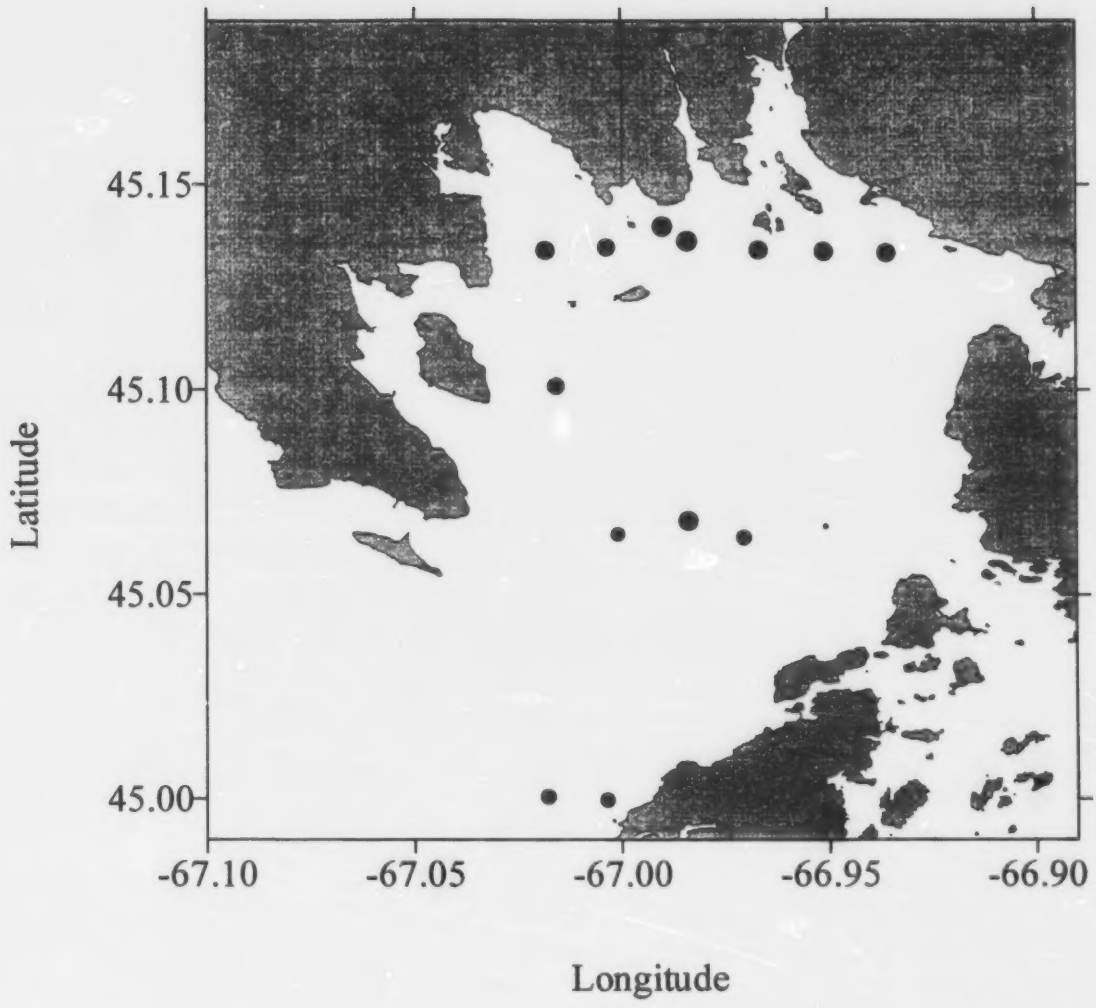

Fig. 29. Percent organic matter in surface (0-2 cm) sediments of Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the percent organic matter in the sediment: Largest symbol = 8.4 %; smallest symbol = 1.8 %.

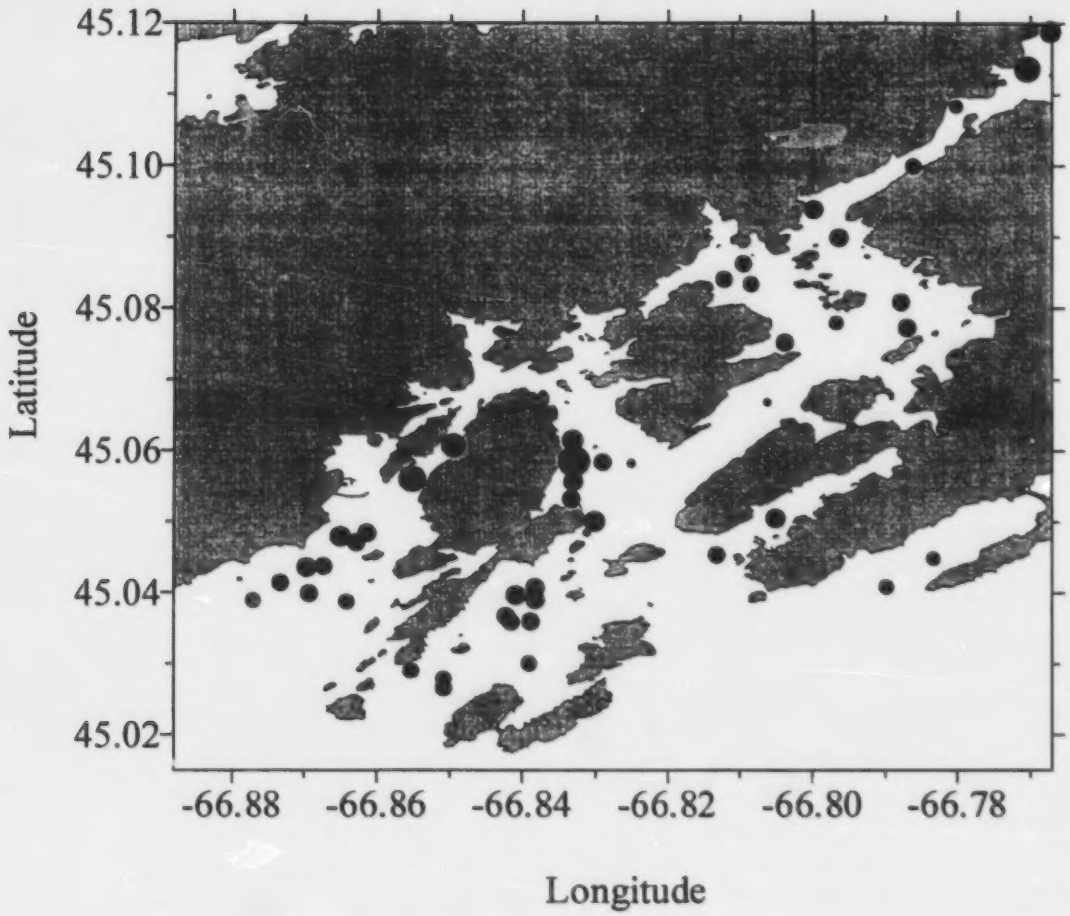

Fig. 30. Percent organic matter in surface (0-2 cm) sediments of the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the percent organic matter in the sediment: Largest symbol = 13.2 %; smallest symbol = 2.9 %.

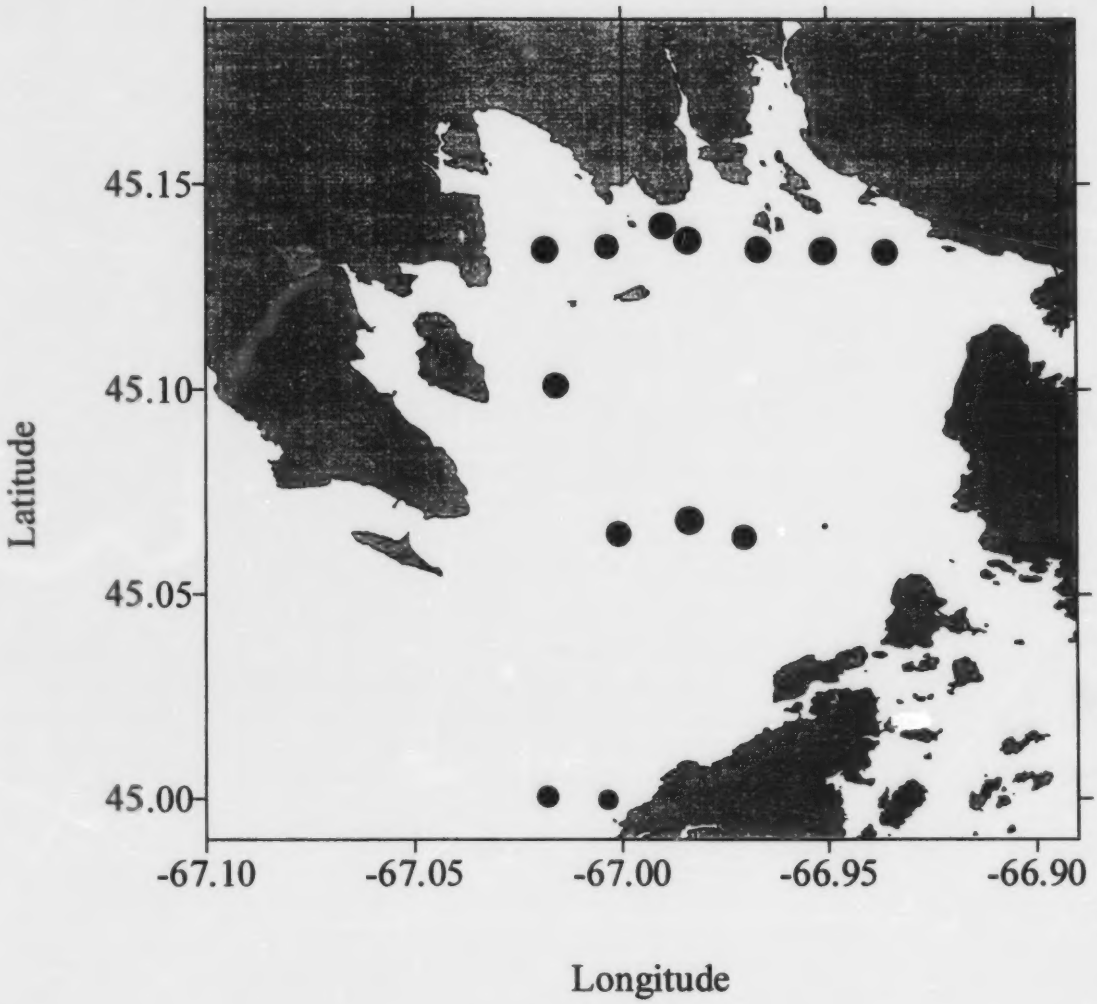

Fig. 31. Percent water in surface (0-2 cm) sediments of Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the percent water in the sediment: Largest symbol = 66.7 %; smallest symbol = 26.7 %.

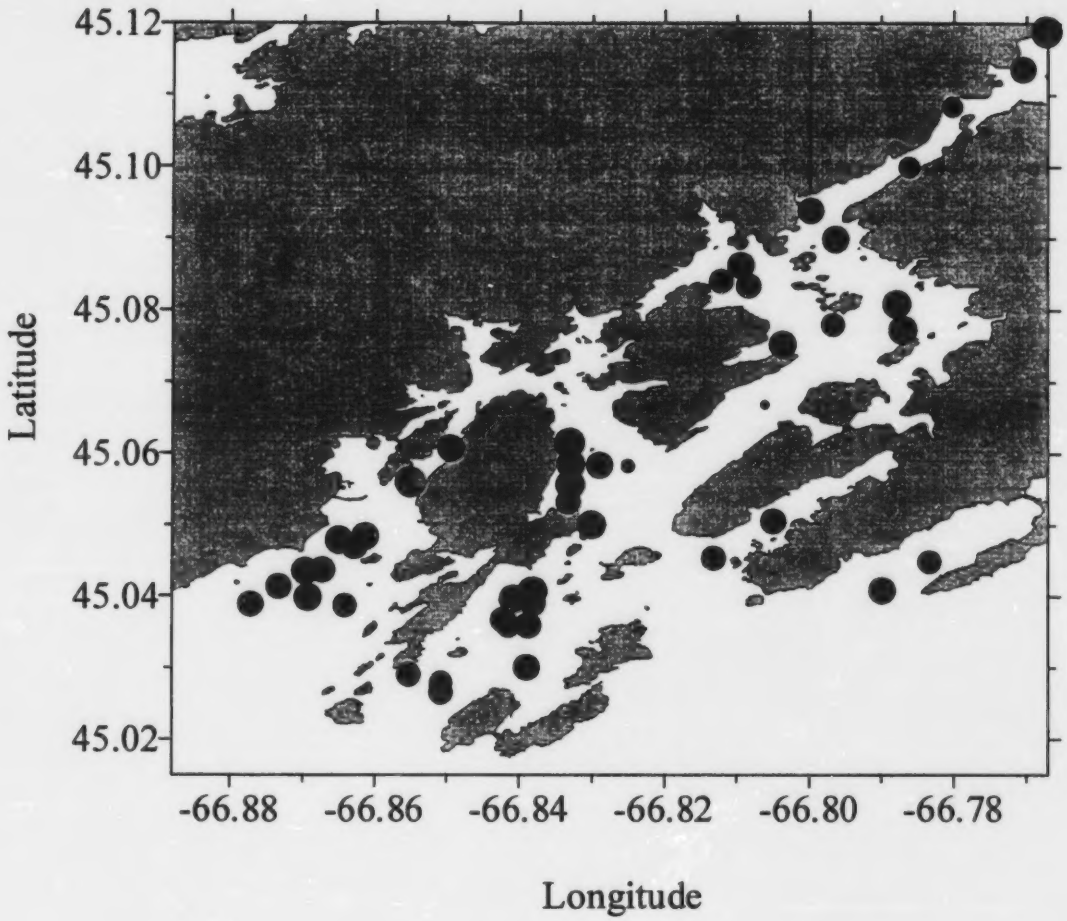

Fig. 32. Percent water in surface (0-2 cm) sediments of the Letang Inlet. The size of the symbol is proportional to the percent water in the sediment: Largest symbol 72.2 %; smallest symbol = 31.8 %.

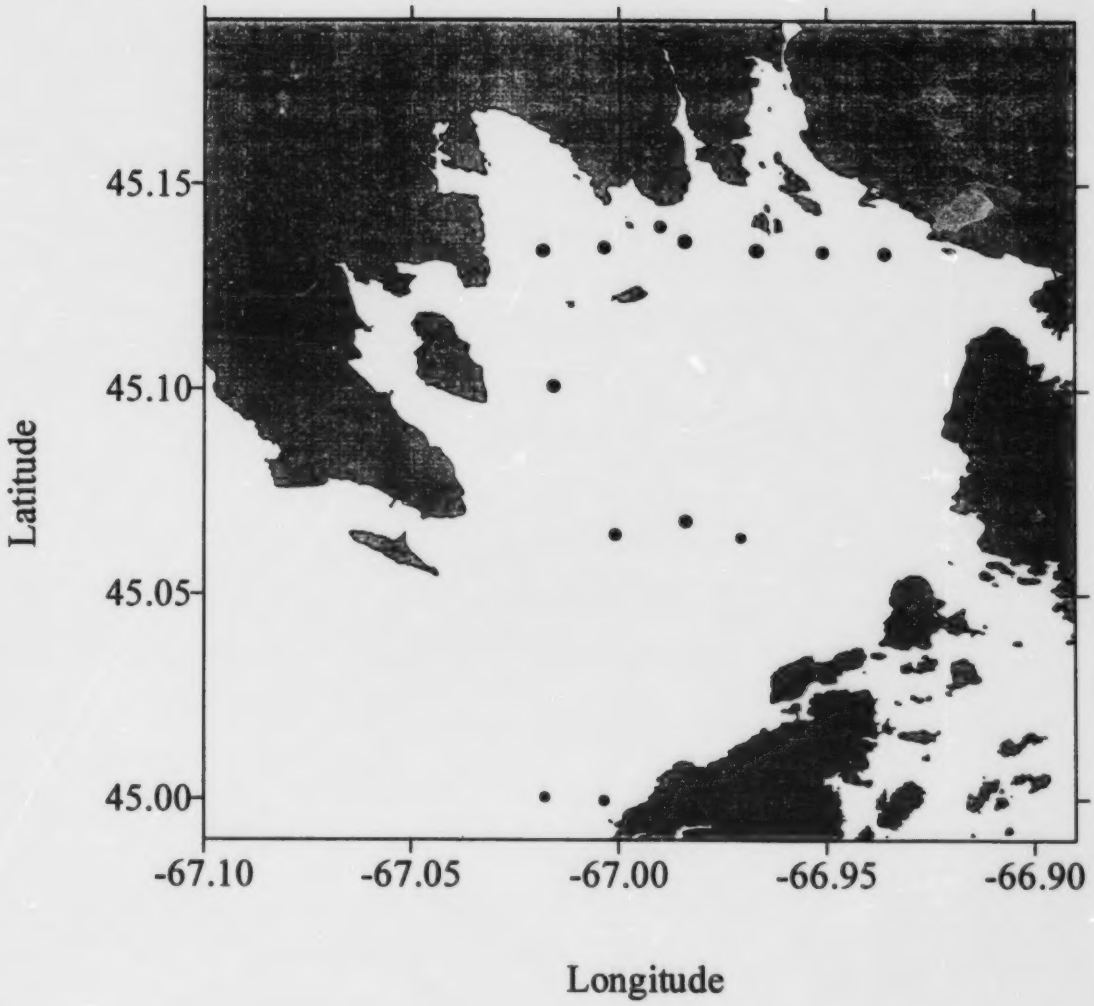

Fig. 33. Copper (Cu) concentration in surface (0-2 cm) sediment in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to the Cu concentration of Cu: Largest symbol = 17 ppm; smallest symbol = 13 ppm.

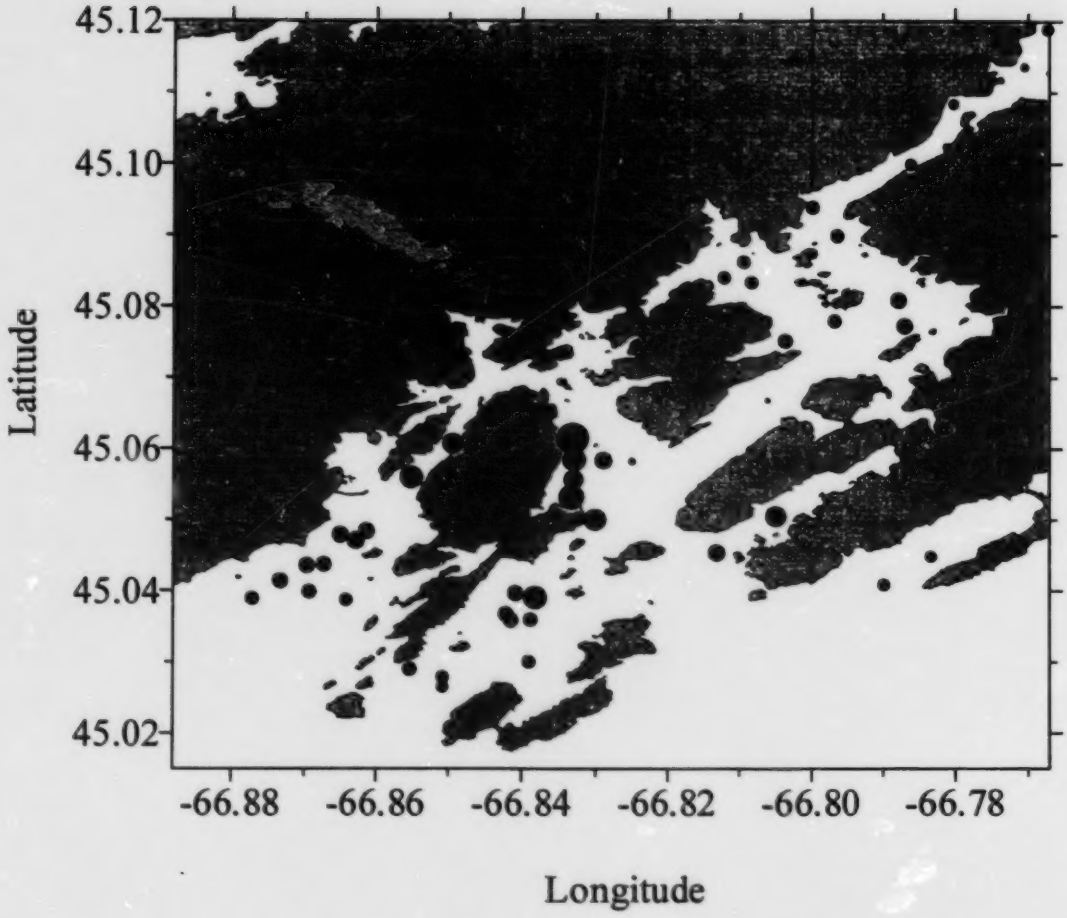

Fig. 34. Copper (Cu) concentration in surface (0-2 cm) sediment in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to the Cu concentration: Largest symbol = 41 ppm; smallest symbol = 7 ppm.

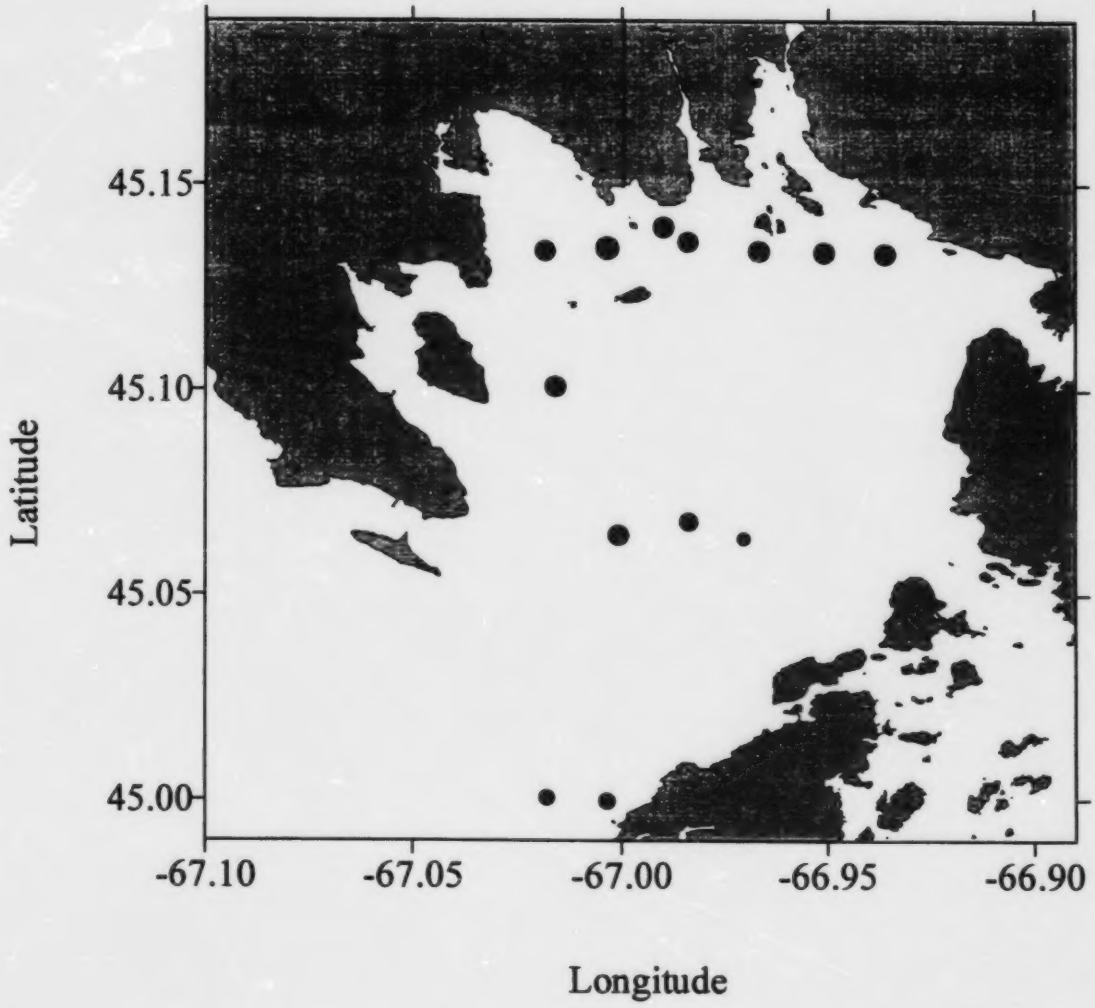

Fig. 35. Zinc concentration in surface (0-2 cm) sediments in Passamaquoddy Bay 7-17 September, 1999. The size of the symbol is proportional to Zn concentration: Largest symbol = 106 ppm; smallest symbol = 76 ppm.

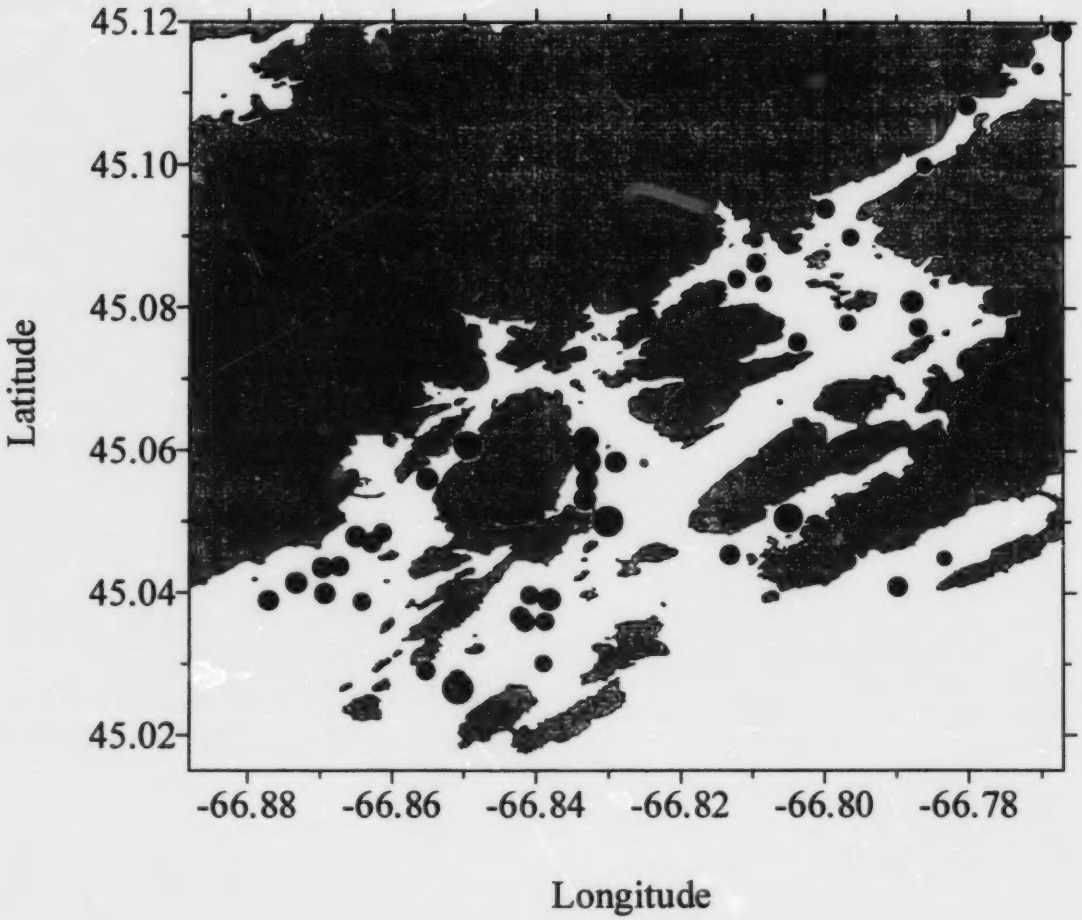

Fig. 36. Zince concentrations in surface (0-2 cm) sediments in the Letang Inlet 7-17 September, 1999. The size of the symbol is proportional to Zn concentrations: Largest symbol = 130 ppm; smallest symbol = 52 ppm.

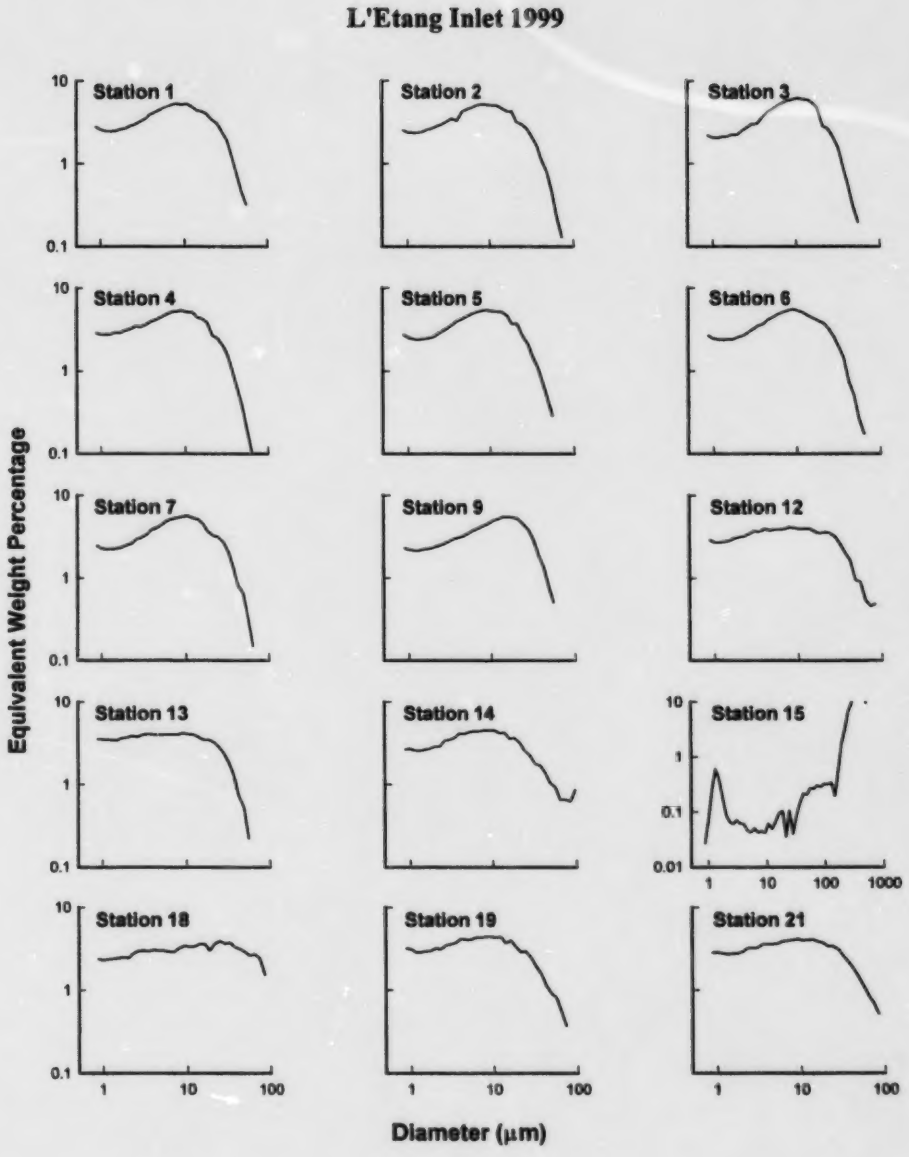

Fig. 37. DIGS (disaggregated inorganic grain size) spectra from grab samples taken in the Letang area 7-17 September, 1999.

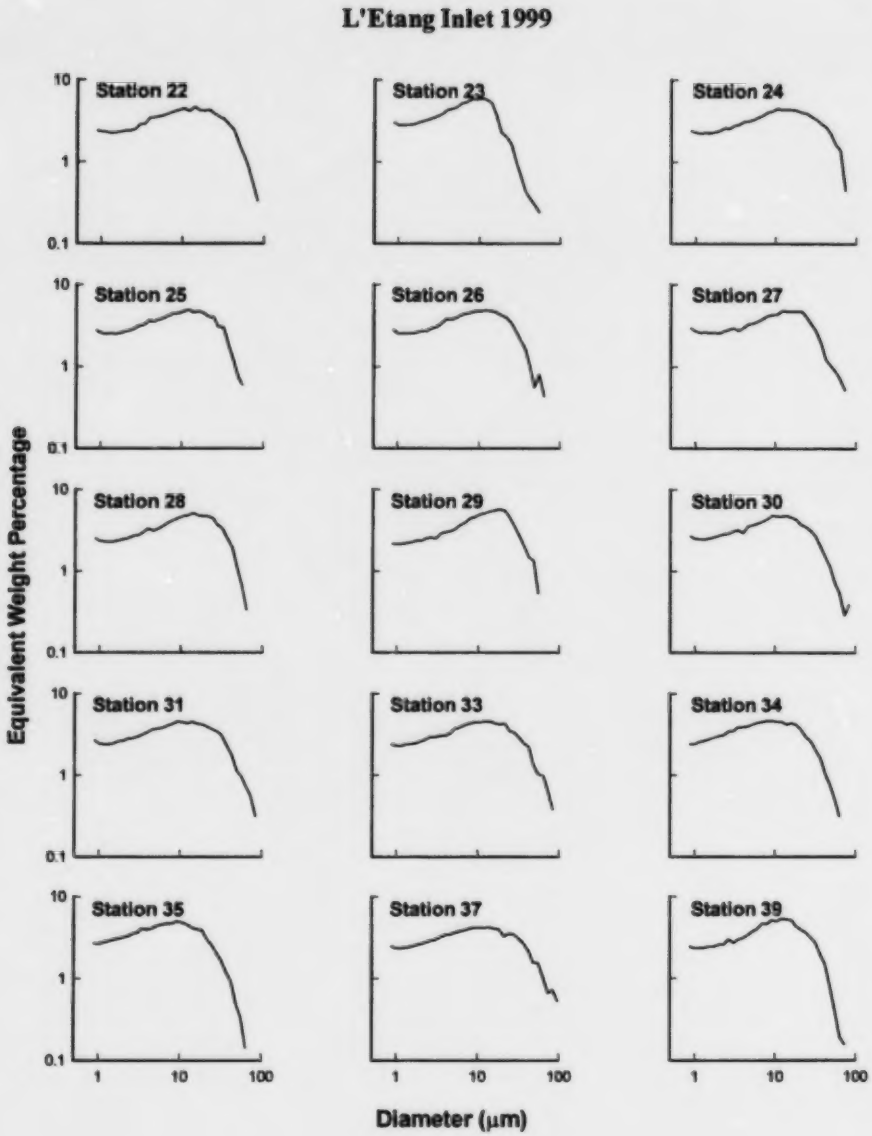

Fig. 38. DIGS (disaggregated inorganic grain size) spectra from grab samples taken in the Letang area 7-17 September, 1999.

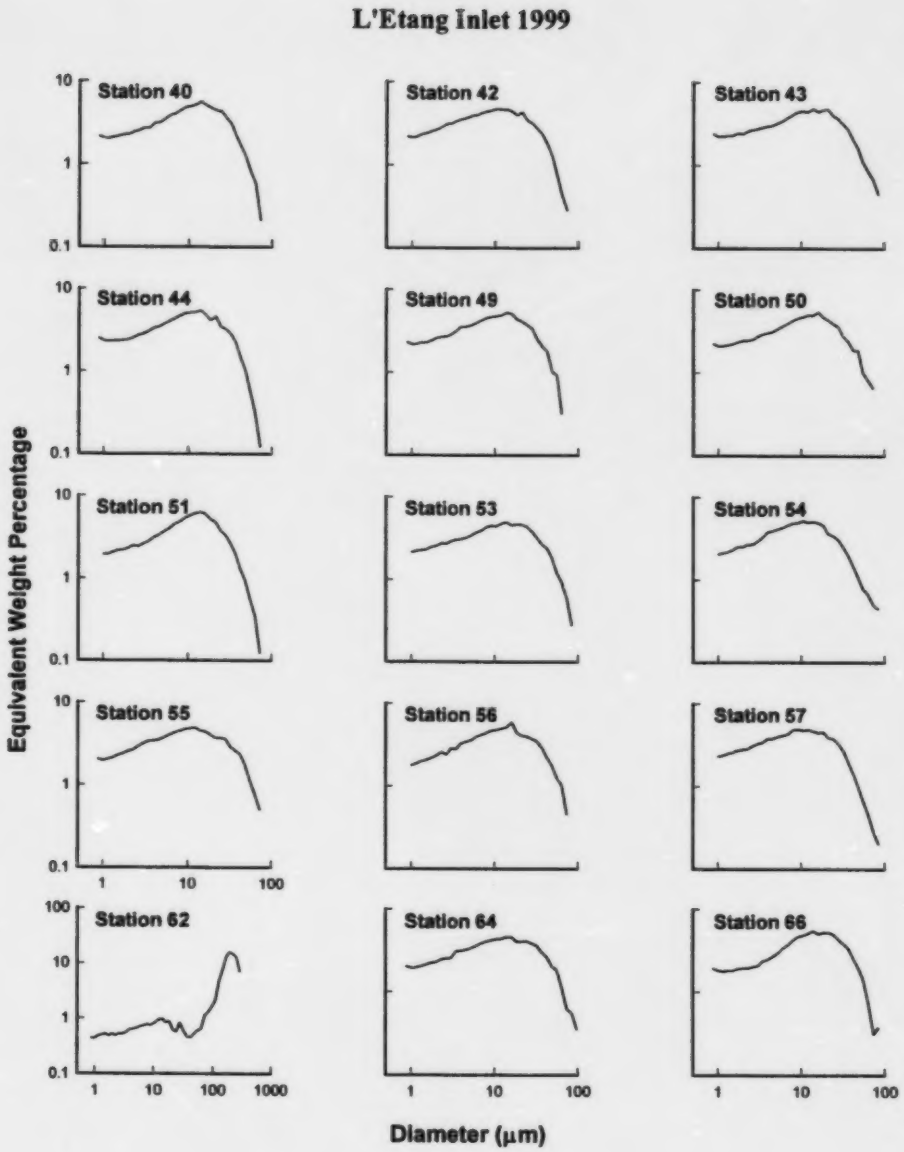

Fig. 39. DIGS (disaggregated inorganic grain size) spectra from grab samples taken in the Letang area 7-17 September, 1999.

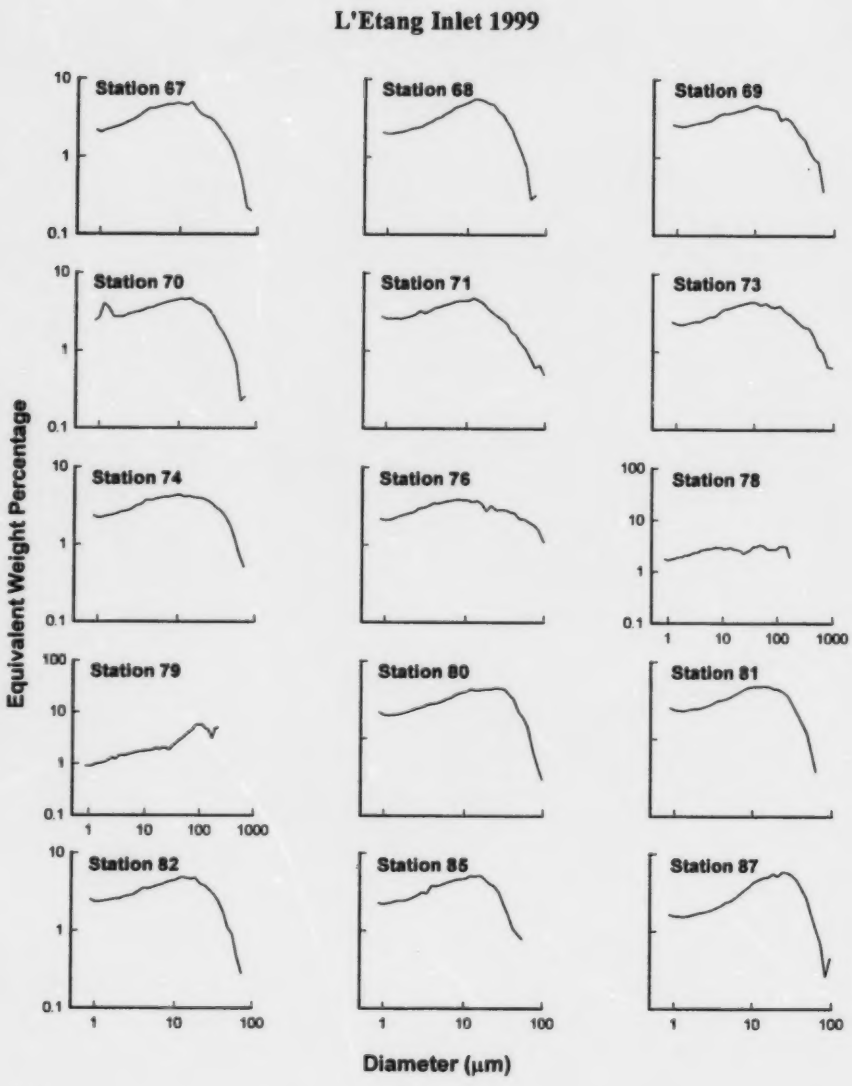

Fig. 40. DIGS (disaggregated inorganic grain size) spectra from grab samples taken in the Letang area 7-17 September, 1999.

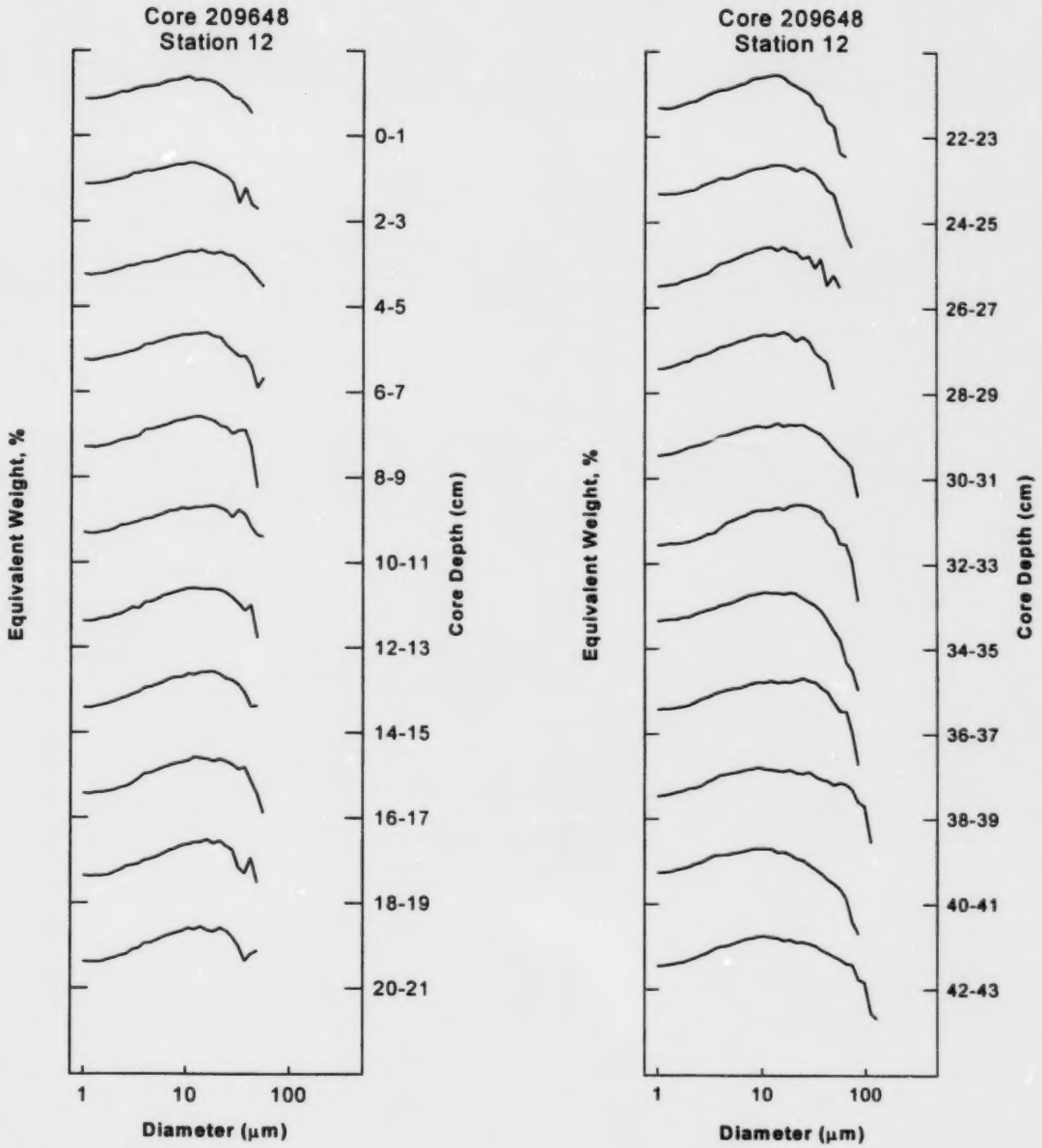

Figure 41. DIGS (disaggregated inorganic grain size) spectra from sediment cores collected in Passamaquoddy Bay, 7-17 September 1999.

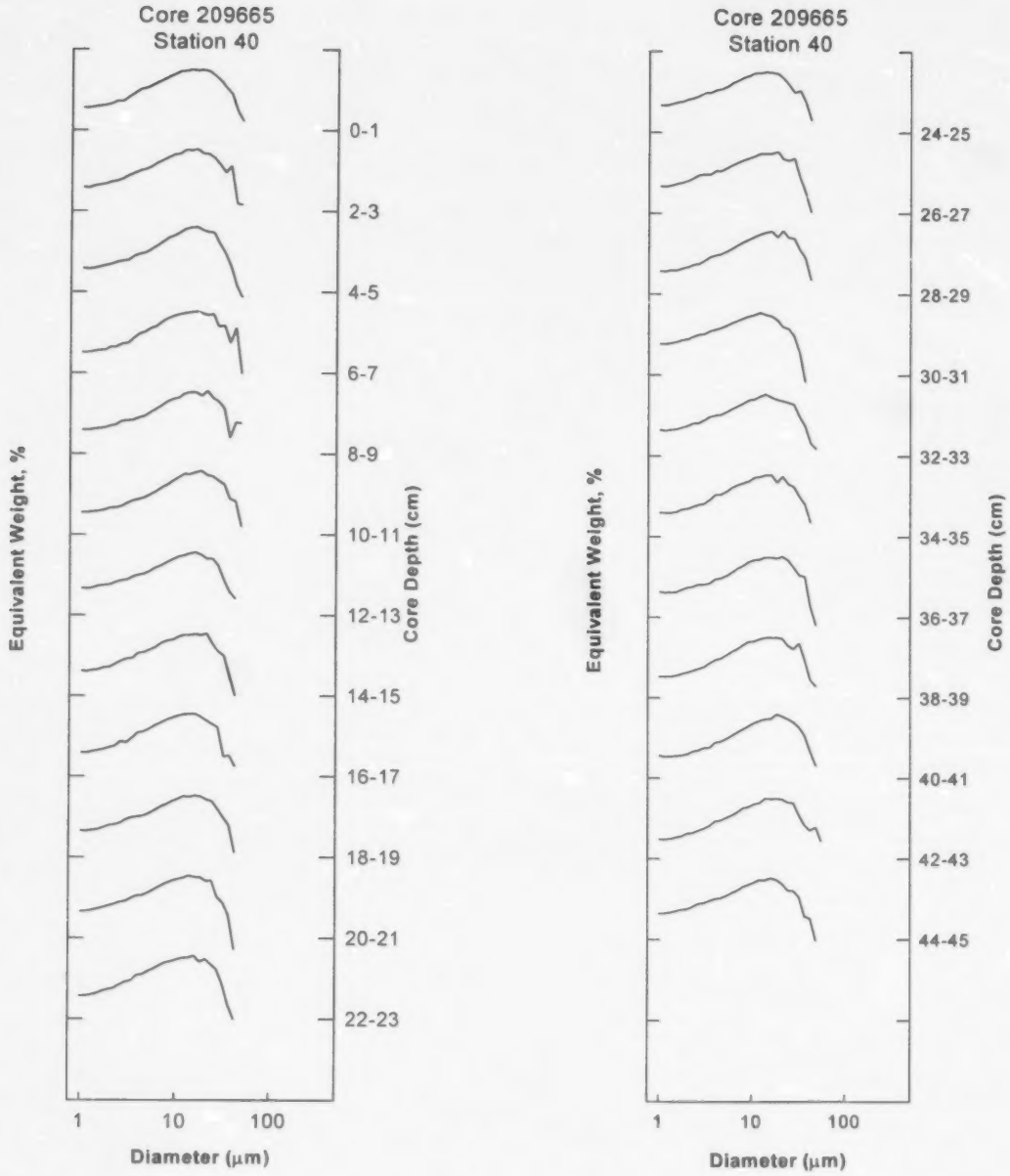

Fig. 42. DIGS (disaggregated inorganic grain size) specta from Bliss Harbour sediment cores collected from Bliss Harbour, 7-17 September 1999.

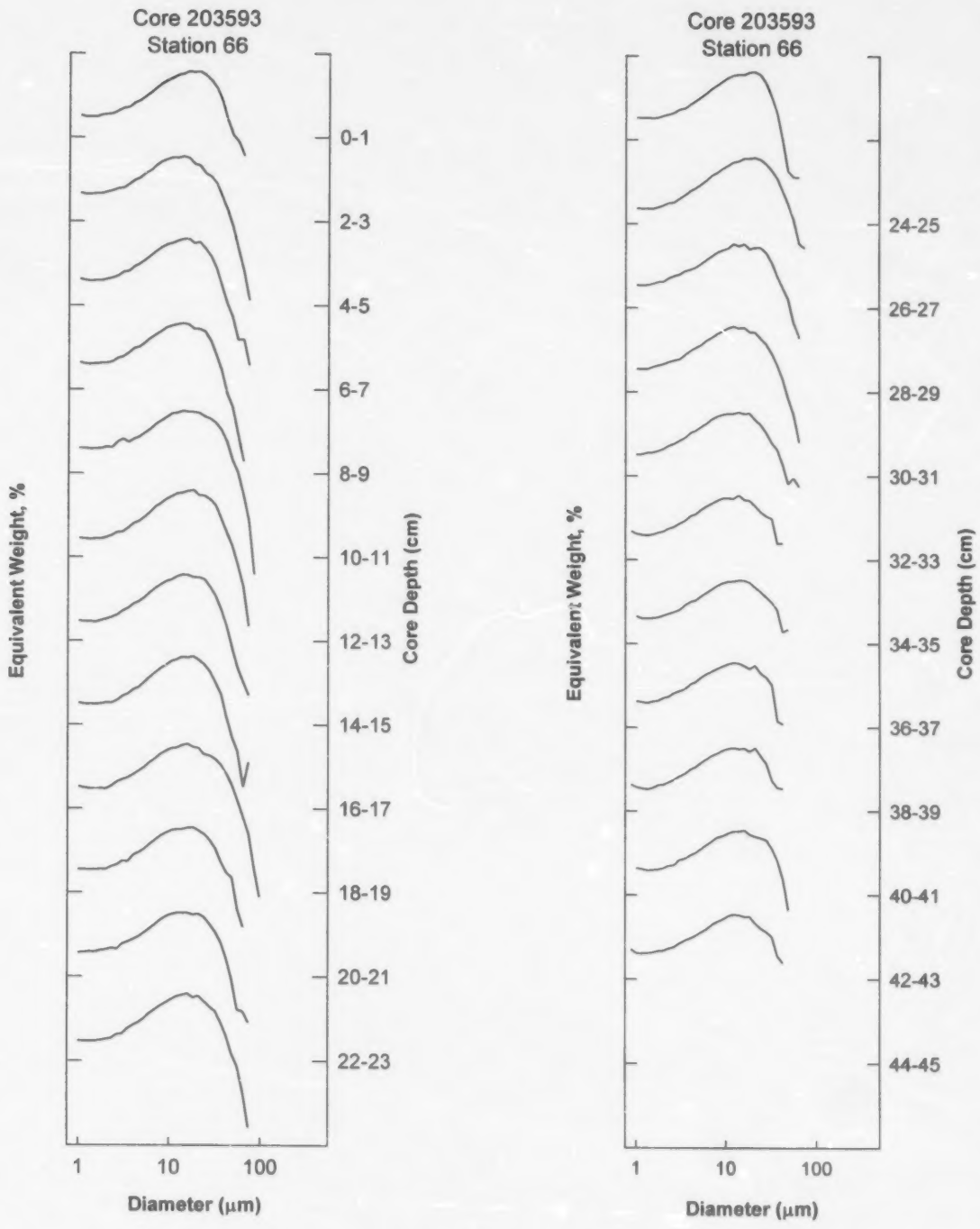

Fig. 43. DIGS (dissagregated inorganic grain szie) spectra from sediment cores from Scotch Bay, 7-17 September 1999.

Appendix A. Summary of 89 sampling sites from 7-17 September 1999 sample collection in Passamaquoddy Bay and Letang Inlet. Water depth was recorded from the depth sounder of the ship used. An "X" by a station number indicates the type of sampling performed at that location. (1 – no grab; 2 – no grab: rocky bottom; 3 – no grab: underwater moorings; 4 – no grab).

Stn	Date	Time (GMT)	Depth (m)	Latitude	Longitude	Niskin Cast	Sediment Grab	B.O.B.	Core
1	8-Sep-99	1645	17.8	45° 08.380'	66° 59.387'	X	X		
2	8-Sep-99	1605	21.4	45° 08.031'	67° 01.093'	X	X		
3	8-Sep-99	1630	23.5	45° 08.076'	67° 00.203'	X	X		
4	8-Sep-99	1704	20.1	45° 08.165'	66° 59.031'	X	X		
5	8-Sep-99	1725	19.5	45° 08.033'	66° 58.004'	X	X		
6	8-Sep-99	1740	16.4	45° 08.014'	66° 57.057'	X	X		
7	8-Sep-99	1805	14.2	45° 07.993'	66° 56.160'	X	X		
8	8-Sep-99	1825	26.3	45° 06.964'	66° 59.022'	X	1	X	
9	8-Sep-99	1850	29.5	45° 06.048'	67° 00.944'	X	X		
12	9-Sep-99	1320	37.1	45° 03.875'	67° 00.043'	X	X		X
13	9-Sep-99	1400	46.0	45° 04.072'	66° 59.017'	X	X	X	
14	9-Sep-99	-	-	45° 03.827'	66° 58.220'	X	X		
15	9-Sep-99	1600	57.0	45° 03.996'	66° 57.045'	X	X		
16	9-Sep-99	1625	75.0	45° 04.054'	66° 56.106'	X	2	X	
17	9-Sep-99	1210	57.9	44° 59.894'	67° 02.790'	X	2		
18	9-Sep-99	1230	51.0	45° 00.025'	67° 01.069'	X	X		
19	9-Sep-99	1250	40.0	44° 59.975'	67° 00.207'	X	X		
20	9-Sep-99	1735	43.0	45° 01.777'	66° 53.087'	X	1	X	

Appendix A (cont.). Summary of 89 sampling sites from the 1999 study. Water depth was recorded from the depth sounder of the ship used. An "X" by a station number indicates the type of sampling performed at that location. (1 – no grab; 2 – no grab: rocky bottom; 3 – no grab: underwater moorings; 4 – no grab).

Stn	Date	Time (GMT)	Depth (m)	Latitude	Longitude	Niskin Cast	Sediment Grab	B.O.B.	Core
21	9-Sep-99	1800	31.7	45° 02.332'	66° 52.628'	X	X		
22	10-Sep-99	1145	17.0	45° 02.390'	66° 52.160'	X	X		
23	10-Sep-99	1122	14.3	45° 02.320'	66° 51.850'	X	X		
24	10-Sep-99	1200	26.8	45° 02.480'	66° 52.400'	X	X		
25	10-Sep-99	1204	22.7	45° 02.610'	66° 52.180'	X	X		
26	10-Sep-99	1225	21.7	45° 02.620'	66° 52.040'	X	X		
27	10-Sep-99	1300	16.9	45° 02.870'	66° 51.900'	X	X		
28	10-Sep-99	1244	18.1	45° 02.820'	66° 51.770'	X	X	X	
29	10-Sep-99	1240	18.4	45° 02.900'	66° 51.680'	X	X		
30	15-Sep-99	1608	15.3	45° 03.356'	66° 51.310'	X	X		
31	15-Sep-99	1526	18.7	45° 03.640'	66° 50.970'	X	X		
32	9-Sep-99	-	-	45° 01.200'	66° 51.330'	X	1	X	
33	9-Sep-99	2130	-	45° 01.590'	66° 51.050'	X	X		
34	14-Sep-99	1612	-	45° 01.670'	66° 51.050'	X	X		
35	9-Sep-99	2125	18.0	45° 01.740'	66° 51.320'	X	X		
37	14-Sep-99	1550	25.8	45° 01.800'	66° 50.340'	X	X		
38	9-Sep-99	2015	20.6	45° 01.925'	66° 50.300'	X	1		
39	14-Sep-99	1451	18.1	45° 02.200'	66° 50.530'	X	X		

Appendix A (cont.). Summary of 89 sampling sites from the 1999 study. Water depth was recorded from the depth sounder of the ship used. An "X" by a station number indicates the type of sampling performed at that location. (1 – no grab; 2 – no grab: rocky bottom; 3 – no grab: underwater moorings; 4 – no grab).

Stn	Date	Time (GMT)	Depth (m)	Latitude	Longitude	Niskin Cast	Sediment Grab	B.O.B.	Core
40	9-Sep-99	1945	18.4	45° 02.150'	66° 50.490'	X	X		X
42	9-Sep-99	2005	13.8	45° 02.155'	66° 50.328'	X	X		
43	9-Sep-99	1955	14.6	45° 02.340'	66° 50.290'	X	X		
44	9-Sep-99	1915	14.4	45° 02.376'	66° 50.450'	X	X	X	
45	14-Sep-99	1420	16.0	45° 02.346'	66° 52.232'	X	3		
47	14-Sep-99	1435	15.9	45° 02.440'	66° 50.290'	X	X		
49	16-Sep-99	1412	12.8	45° 02.907'	66° 49.871'	X	X		
50	16-Sep-99	1356	15.4	45° 03.000'	66° 49.807'	X	X		
51	16-Sep-99	1340	10.6	45° 03.191'	66° 49.997'	X	X		
53	16-Sep-99	-	14.0	45° 03.338'	66° 49.981'	X	X		
54	16-Sep-99	1233	5.7	45° 03.508'	66° 49.976'	X	X		
55	16-Sep-99	-	16.0	45° 03.500'	66° 49.740'	X	X		
56	16-Sep-99	-	19.0	45° 03.493'	66° 49.503'	X	X		
57	16-Sep-99	1220	-	45° 03.685'	66° 49.987'	X	X		X
60	15-Sep-99	2100	21.5	45° 03.430'	66° 49.130'	X	1		
61	16-Sep-99	1430	22.2	45° 03.678'	66° 48.793'	X	2		
62	16-Sep-99	1440	15.3	45° 04.009'	66° 48.370'	X	X		
63	15-Sep-99	1936	23.0	45° 04.240'	66° 48.080'	X	1		

Appendix A (cont.). Summary of 89 sampling sites from the 1999 study. Water depth was recorded from the depth sounder of the ship used. An "X" by a station number indicates the type of sampling performed at that location. (1 – no grab; 2 – no grab: rocky bottom; 3 – no grab: underwater moorings; 4 – no grab).

Stn	Date	Time (GMT)	Depth (m)	Latitude	Longitude	Niskin Cast	Sediment Grab	B.O.B.	Core
64	16-Sep-99	1540	8.0	45° 04.511'	66° 48.224'	X	X		
66	16-Sep-99	1550	6.1	45° 05.001'	66° 48.506'	X	X		X
67	16-Sep-99	-	5.5	45° 05.040'	66° 48.730'	X	X		
68	16-Sep-99	1624	6.3	45° 05.173'	66° 48.569'	X	X		
69	16-Sep-99	1635	12.7	45° 04.676'	66° 47.804'	X	X		
70	16-Sep-99	1653	11.3	45° 04.635'	66° 47.218'	X	X		
71	17-Sep-99	-	10.6	45° 04.850'	66° 47.269'	X	X		
73	17-Sep-99	-	8.8	45° 05.391'	66° 47.782'	X	X		
74	17-Sep-99	-	10.0	45° 05.630'	66° 47.990'	X	X		
76	17-Sep-99	1500	6.0	45° 05.996'	66° 47.168'	X	X		
78	17-Sep-99	-	4.2	45° 06.500'	66° 46.814'	X	X		
79	15-Sep-99	1828	5.7	45° 06.814'	66° 46.229'	X	X		
80	15-Sep-99	1755	4.4	45° 07.130'	66° 46.035'	X	X		
81	14-Sep-99	1346	12.5	45° 03.030'	66° 48.300'	X	X		
82	14-Sep-99	1324	22.8	45° 02.720'	66° 48.790'	X	X		
83	14-Sep-99	1308	33.3	45° 02.050'	66° 48.690'		1	X	
84	14-Sep-99	1255	31.2	45° 02.060'	66° 47.720'	X	1		
85	14-Sep-99	1240	23.6	45° 02.450'	66° 47.390'	X	X		

Appendix A (cont.). Summary of 89 sampling sites from the 1999 study. Water depth was recorded from the depth sounder of the ship used. An "X" by a station number indicates the type of sampling performed at that location. (1 – no grab; 2 – no grab: rocky bottom; 3 – no grab: underwater moorings; 4 – no grab, stn very close to stn 87).

Stn	Date	Time (GMT)	Depth (m)	Latitude	Longitude	Niskin Cast	Sediment Grab	B.O.B.	Core
86	14-Sep-99	1220	15.0	45° 02.710'	66° 46.970'		4	X	X
87	14-Sep-99	1155	15.0	45° 02.690'	66° 47.000'	X	X		
88	13-Sep-99	1605	34.0	45° 04.580'	67° 00.140'	X	1		
89	13-Sep-99	1640	32.0	45° 05.080'	67° 00.810'	X	1		
90	13-Sep-99	1703	26.0	45° 05.670'	67° 01.230'	X	1		
91	13-Sep-99	1716	34.4	45° 05.200'	67° 00.740'	X	1		
93	13-Sep-99	1250	39.1	45° 05.200'	67° 00.740'	X	1		
94	13-Sep-99	1330	42.0	45° 04.160'	67° 00.120'	X	1		
95	13-Sep-99	1400	41.7	45° 04.100'	66° 59.990'	X	1		
96	13-Sep-99	1420	44.3	45° 04.130'	66° 59.910'	X	1		
97	13-Sep-99	1445	46.0	45° 04.230'	66° 59.480'	X	1	X	
98	13-Sep-99	1922	20.1	45° 04.220'	66° 58.710'	X	1	X	
99	13-Sep-99	1946	21.1	45° 02.800'	66° 51.980'	X	1		
100	13-Sep-99	2016	32.0	45° 02.480'	66° 52.380'	X	1		
101	13-Sep-99	2035	55.0	45° 02.170'	66° 52.720'	X	1		
102	13-Sep-99	2057	77.0	45° 01.270'	66° 52.820'	X	1	X	
103	15-Sep-99	1215	41.3	45° 04.340'	66° 59.800'	X	1	X	

Appendix B. Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column			B.O.B.	
			Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. Depth (cm)	Salinity
1	45° 08.380'	66° 59.387'	2	31.594			
2	45° 08.031'	67° 01.093'	2	31.812			
3	45° 08.076'	67° 00.203'	2	31.691			
4	45° 08.165'	66° 59.031'	2	31.613			
5	45° 08.033'	66° 58.004'	2	31.479			
6	45° 08.014'	66° 57.057'	2	31.040			
7	45° 07.993'	66° 56.160'	2	31.176			
8	45° 06.964'	66° 59.022'	2	31.929			
9	45° 06.048'	67° 00.944'	2	32.009			
12	45° 03.875'	67° 00.043'	2	32.099			
13	45° 04.072'	66° 59.017'	2	32.064			
14	45° 03.827'	66° 58.220'	2	32.250			
15	45° 03.996'	66° 57.045'	2	32.359			
16	45° 04.054'	66° 56.106'	2	32.342			
17	44° 59.894'	67° 02.790'	2	31.878			
18	45° 00.025'	67° 01.069'	2	31.933			
19	44° 59.975'	67° 00.207'	2	31.995			
20	45° 01.777'	66° 53.087'	2	32.432			
21	45° 02.332'	66° 52.628'	2	32.344			

Appendix B (cont.). Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column			B.O.B.	
			Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. Depth (cm)	Salinity
22	45° 02.390'	66° 52.160'	2	32.380			
23	45° 02.320'	66° 51.850'	2	32.381			
24	45° 02.480'	66° 52.400'	2	32.376			
25	45° 02.610'	66° 52.180'	2	32.377			
26	45° 02.620'	66° 52.040'	2	32.377			
27	45° 02.870'	66° 51.900'	2	32.374			
28	45° 02.820'	66° 51.770'	2	32.380		25	32.379
29	45° 02.900'	66° 51.680'	2	32.368			
30	45° 03.356'	66° 51.310'	2	32.405			
31	45° 03.640'	66° 50.970'	2	32.401			
32	45° 01.200'	66° 51.330'	2	32.370		25	32.370
33	45° 01.590'	66° 51.050'	2	32.322			
34	45° 01.670'	66° 51.050'	2	32.377			
			12	32.398	0.231		
35	45o 01.740'	66° 51.320'	2	32.312			
37	45° 01.800'	66° 50.340'	2	32.375			
38	45o 01.925'	66o 50.300'	2	32.317			
39	45° 02.200'	66° 50.530'	2	32.374			
40	45° 02.150'	66° 50.490'	2	32.316			

Appendix B (cont.) Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. B.O.B. Depth (cm)	Salinity
42	45° 02.155'	66° 50.328'	2	32.314			
43	45° 02.340'	66° 50.290'	2	32.320			
44	45° 02.376'	66° 50.450'	2	32.308			
45	45° 02.346'	66° 52.232'	2	32.366			
			6	32.363	0.388		
47	45° 02.440'	66° 50.290'	2	32.361			
49	45° 02.907'	66° 49.871'	2	32.264			
50	45° 03.000'	66° 49.807'	2	32.274			
51	45° 03.191'	66° 49.997'	2	32.268			
53	45° 03.338'	66° 49.981'	2	32.230			
54	45° 03.508'	66° 49.976'	2	32.345			
55	45° 03.500'	66° 49.740'	2	32.307			
56	45° 03.493'	66° 49.503'	2	32.260			
57	45° 03.685'	66° 49.987'	2	32.341			
60	45° 03.430'	66° 49.130'	2	31.414			
			10	32.377	0.297		
61	45° 03.678'	66° 48.793'	2	32.189			
62	45° 04.009'	66° 48.370'	2	32.216			
63	45° 04.240'	66° 48.080'	2	32.322			
			11	32.361	0.374		

Appendix B (cont.). Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column			B.O.B.	
			Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. Depth (cm)	Salinity
64	45° 04.511'	66° 48.224'	2	32.184			
66	45° 05.001'	66° 48.506'	2	32.127			
67	45° 05.040'	66° 48.730'	2	32.150			
68	45° 05.173'	66° 48.569'	2	32.217			
69	45° 04.676'	66° 47.804'	2	32.199			
70	45° 04.635'	66° 47.218'	2	32.126			
71	45° 04.850'	66° 47.269'	2	32.131			
73	45° 05.391'	66° 47.782'	2	31.600			
74	45° 05.630'	66° 47.990'	2	31.643			
76	45° 05.996'	66° 47.168'	2	31.288			
78	45° 06.500'	66° 46.814'	2	31.217			
79	45° 06.814'	66° 46.229'	3	31.786			
80	45° 07.130'	66° 46.035'	2.5	31.149			
81	45° 03.030'	66° 48.300'	2	32.330			
82	45° 02.720'	66° 48.790'	2	32.341			
83	45° 02.050'	66° 48.690'				25	32.532
84	45° 02.060'	66° 47.720'	15	32.364	0.236		
85	45° 02.450'	66° 47.390'	2	32.355			

Appendix B (cont.). Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column			B.O.B.	
			Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. Depth (cm)	Salinity
86	45° 02.710'	66° 46.970'				25	32.320
87	45° 02.690'	66° 47.000'	2	32.338			
88	45° 04.580'	67° 00.140'	2	31.945			
			21	32.288	0.261		
			29	32.334			
89	45° 05.080'	67° 00.810'	2	31.906			
			14	32.264	0.256		
			28	32.337			
90	45° 05.670'	67° 01.230'	1	31.902			
			12	32.194	0.233		
			20	32.320			
91	45° 05.200'	67° 00.740'	2	31.904			
			15	32.289	0.243		
			28	32.339			
93	45° 04.160'	67° 00.120'	2	31.896			
			23	32.329	0.240		
			34	32.355			
94	45° 04.100'	66° 59.990'	2	31.955			
			21	32.341	0.240		
			36	32.351			
95	45° 04.130'	66° 59.910'	2	31.924			
			20	32.335	0.221		
			35	32.362			
96	45° 04.230'	66° 59.480'	3	32.181			
			20	32.331	0.256		
			38	32.351			

Appendix B (cont.). Salinity and copper measurements from Niskin and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Salinity	Copper ($\mu g\ L^{-1}$)	B.O.B. B.O.B. Depth (cm)	Salinity
97	45° 04.220'	66° 58.710'	2	31.993		15	32.374
			22	32.321	0.233	25	32.337
			42	32.356		35	32.374
						45	32.377
98	45° 02.960'	66° 51.750'	2	32.404		25	32.446
			11	32.426			
			14	32.432			
99	45° 02.800'	66° 51.980'	2	32.399			
			9	32.418	0.274		
			15	32.428			
100	45° 02.480'	66° 52.380'	3	32.330			
			12	32.441	0.199		
			24	32.485			
101	45° 02.170'	66° 52.720'	4	32.402			
			25	32.461	0.191		
			48	32.496			
102	45° 01.270'	66° 52.820'	2	32.409		25	32.633
			35	32.453	0.215		
			68	32.466			
103	45° 04.340'	66° 59.800'				5	32.364

Appendix C. Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (μM)	P (μM)	NO_3 (μM)	NH_3 (μM)	NO_2 (μM)
1	45° 08.380'	66° 59.387'	2	1.44	0.439	0.26	1.727	0.051
2	45° 08.031'	67° 01.093'	2	1.28	0.374	0.27	1.734	0.056
3	45° 08.076'	67° 00.203'	2	1.43	0.441	0.24	1.683	0.049
4	45° 08.165'	66° 59.031'	2	1.38	0.421	0.27	1.493	0.042
5	45° 08.033'	66° 58.004'	2	1.53	0.484	0.23	1.372	0.044
6	45° 08.014'	66° 57.057'	2	3.19	0.564	0.34	1.502	0.058
7	45° 07.993'	66° 56.160'	2	2.90	0.530	0.28	1.444	0.055
8	45° 06.964'	66° 59.022'	2	1.49	0.375	0.25	1.170	0.052
9	45° 06.048'	67° 00.944'	2	1.83	0.408	0.30	1.682	0.053
12	45° 03.875'	67° 00.043'	2	1.17	0.434	0.35	1.504	0.037
13	45° 04.072'	66° 59.017'	2	1.04	0.405	0.25	1.414	0.031
14	45° 03.827'	66° 58.220'	2	2.82	0.644	1.83	3.221	0.156
15	45° 03.996'	66° 57.045'	2	3.38	0.658	2.67	2.329	0.152
16	45° 04.054'	66° 56.106'	2	3.27	0.701	2.57	2.439	0.170
17	44° 59.894'	67° 02.790'	2	1.56	0.516	0.44	3.211	0.095
18	45° 00.025'	67° 01.069'	2	1.31	0.510	0.42	1.258	0.067
19	44° 59.975'	67° 00.207'	2	1.19	0.503	0.33	1.376	0.038
20	45° 01.777'	66° 53.087'	2	3.38	0.707	3.17	2.467	0.163
21	45° 02.332'	66° 52.628'	2	2.32	0.598	1.36	1.919	0.093

Appendix C (cont.) Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
22	45° 02.390'	66° 52.160'	2	3.73	0.745	2.51	3.799	0.284
24	45° 02.480'	66° 52.400'	2	2.91	0.754	1.94	3.639	0.278
25	45° 02.610'	66° 52.180'	2	2.95	7.370	2.01	3.386	0.290
26	45° 02.620'	66° 52.040'	2	3.00	0.723	2.08	2.793	0.266
27	45° 02.870'	66° 51.900'	2	2.88	0.650	1.66	8.146	0.137
28	45° 02.820'	66° 51.770'	2	3.36	0.711	2.00	3.702	0.269
29	45° 02.900'	66° 51.680'	2	3.03	0.744	1.76	3.857	0.268
30	45° 03.356'	66° 51.310'	2	3.46	0.850	2.62	4.754	0.286
31	45° 03.640'	66° 50.970'	2	2.96	0.757	2.32	6.931	0.229
32	45° 01.200'	66° 51.330'	2	3.53	0.732	2.73	2.711	0.270
33	45° 01.590'	66° 51.050'	2	1.85	0.580	1.02	1.832	0.199
34	45° 01.670'	66° 51.050'	2	1.76	0.513	1.33	2.349	0.145
			12	2.47	0.611	2.15	2.093	0.186
35	45o 01.740'	66° 51.320'	2	1.75	0.548	0.60	3.582	0.190
37	45° 01.800'	66° 50.340'	2	1.70	0.512	1.14	1.790	0.150
38	45o 01.925'	66o 50.300'	2	4.00	1.067	1.66	2.624	0.290
39	45° 02.200'	66° 50.530'	2	1.76	0.547	1.22	2.120	0.166
40	45° 02.150'	66° 50.490'	2	1.45	0.607	0.73	4.650	0.054
42	45° 02.155'	66° 50.328'	2	1.24	0.525	0.50	1.865	0.054

Appendix C (cont.). Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
43	45° 02.340'	66° 50.290'	2	1.25	0.527	0.49	1.818	0.037
44	45° 02.376'	66° 50.450'	2	1.39	0.589	0.62	2.162	0.050
45	45° 02.346'	66° 52.232'	2	2.04	0.691	1.29	1.749	0.280
			6	1.99	0.650	1.28	2.284	0.275
47	45° 02.440'	66° 50.290'	2	2.04	0.627	1.28	2.240	0.186
49	45° 02.907'	66° 49.871'	2	1.08	0.637	1.00	2.567	0.134
50	45° 03.000'	66° 49.807'	2	1.10	0.653	1.08	2.747	0.175
51	45° 03.191'	66° 49.997'	2	1.20	0.642	1.14	3.084	0.155
53	45° 03.338'	66° 49.981'	2	1.15	0.636	1.18	2.688	0.144
55	45° 03.500'	66° 49.740'	2	1.05	0.540	0.76	2.516	0.109
56	45° 03.493'	66° 49.503'	2	1.25	0.633	1.04	2.404	0.147
60	45° 03.430'	66° 49.130'	2	1.48	0.589	1.19	2.063	0.184
			10	1.69	0.615	1.44	2.316	0.174
61	45° 03.678'	66° 48.793'	2	1.15	0.670	0.96	2.825	0.139
62	45° 04.009'	66° 48.370'	2	1.13	0.642	0.94	2.221	0.134
64	45° 04.511'	66° 48.224'	2	0.99	0.688	0.62	2.256	0.111
66	45° 05.001'	66° 48.506'	2	0.94	0.646	0.54	2.121	0.112
67	45° 05.040'	66° 48.730'	2	0.80	0.682	0.37	2.175	0.094

Appendix C (cont.). Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
68	45° 05.173'	66° 48.569'	2	0.93	0.643	0.58	2.110	0.116
69	45° 04.676'	66° 47.804'	2	1.14	0.679	0.75	2.369	0.138
70	45° 04.635'	66° 47.218'	2	1.84	0.763	1.03	2.342	0.226
79	45° 06.814'	66° 46.229'	3	3.78	1.114	1.80	3.598	0.326
80	45° 07.130'	66° 46.035'	2.5	6.68	1.579	2.52	5.114	0.445
81	45° 03.030'	66° 48.300'	2	2.18	2.085	2.15	21.062	0.344
82	45° 02.720'	66° 48.790'	2	1.97	0.740	1.71	4.907	0.328
84	45° 02.060'	66° 47.720'	15	1.92	0.619	1.65	1.669	0.231
85	45° 02.450'	66° 47.390'	2	1.68	0.611	1.02	1.248	0.195
87	45° 02.690'	66° 47.000'	2	1.06	0.490	0.32	1.098	0.131
88	45° 04.580'	67° 00.140'	2	0.72	0.361	0.28	2.879	0.088
			21	2.92	0.679	2.08	2.439	0.235
			29	3.34	0.712	2.41	3.168	0.258
89	45° 05.080'	67° 00.810'	2	1.17	0.320	0.37	2.868	0.056
			14	3.10	0.701	1.69	2.425	0.223
			28	4.36	0.814	2.88	4.126	0.304
90	45° 05.670'	67° 01.230'	1	1.09	0.411	0.31	1.297	0.075
			12	1.66	0.532	0.56	1.229	0.108
			20	4.43	0.846	2.54	3.525	0.276
91	45° 05.200'	67° 00.740'	2	0.98	0.385	0.28	2.114	0.092
			15	3.19	0.694	2.20	2.542	0.263
			28	5.28	0.877	2.98	5.090	0.300

Appendix C (cont.). Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
93	45° 04.160'	67° 00.120'	2	0.84	0.407	0.23	1.428	0.079
			23	3.83	0.746	2.36	3.906	0.259
			34	5.31	0.980	3.01	3.928	0.035
94	45° 04.100'	6[illegible]° 59.990'	2	0.95	0.416	0.17	1.218	0.126
			21	4.04	0.782	2.80	3.771	0.229
			36	4.57	0.821	2.64	3.608	0.277
95	45° 04.130'	66° 59.910'	2	0.93	0.384	0.25	1.430	0.089
			20	3.72	0.773	2.79	3.478	0.231
			35	4.35	0.829	3.06	3.182	0.297
96	45° 04.230'	66° 59.480'	3	1.55	0.546	0.54	1.666	0.177
			20	3.69	0.764	2.74	3.134	0.264
			38	3.82	0.797	2.97	3.018	2.920
97	45° 04.220'	66° 58.710'	2	1.11	0.470	0.29	1.437	0.108
			22	3.54	0.734	2.63	2.857	0.296
			42	4.04	7.950	3.07	3.225	0.299
98	45° 02.960'	66° 51.750'	2	3.60	0.715	2.54	0.492	0.288
			11	4.43	0.819	3.25	3.467	0.300
			14	4.91	0.835	3.60	3.037	0.297
99	45° 02.800'	66° 51.980'	2	3.57	0.703	2.28	3.046	0.271
			9	4.24	0.766	3.08	3.321	0.300
			15	4.07	0.781	3.40	2.546	0.302
100	45° 02.480'	66° 52.380'	3	3.29	0.703	2.32	3.091	0.278
			12	4.38	0.791	3.39	2.793	0.312
			24	4.26	0.870	3.75	3.742	0.266

Appendix C (cont.). Dissolved inorganic nutrient concentrations from Niskin casts.

Stn	Latitude (N)	Longitude (W)	Niskin Depth (m)	Water Column Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
101	45° 02.170'	66° 52.720'	4	3.11	0.685	2.48	4.172	0.278
			25	4.08	0.771	3.62	2.679	0.298
			48	4.78	0.837	3.79	3.023	0.313
102	45° 01.270'	66° 52.820'	2	3.48	0.732	2.82	2.767	0.283
			35	4.38	0.777	3.51	2.751	0.290
			68	3.65	0.722	3.18	2.692	0.272

Appendix D. Dissolved inorganic nutrient concentrations from B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	B.O.B. Depth (m)	B.O.B. Nutrients Si (µM)	P (µM)	NO_3 (µM)	NH_3 (µM)	NO_2 (µM)
13	45° 04.072'	66° 59.017'	25	3.28	0.710	2.14	2.716	0.194
16	45° 04.054'	66° 56.106'	25	3.25	0.705	2.76	2.456	0.170
20	45° 01.777'	66° 53.087'	25	3.82	0.745	3.83	2.126	0.176
28	45° 02.820'	66° 51.770'	25	3.34	0.717	2.28	2.864	0.364
32	45° 01.200'	66° 51.330'	25	3.81	0.779	2.68	2.854	0.294
44	45° 02.376'	66° 50.450'	25	2.88	0.749	1.54	3.327	0.140
83	45° 02.050'	66° 48.690'	25	4.61	0.844	3.80	2.712	0.296
86	45° 02.710'	66° 46.970'	25	3.28	0.654	2.11	2.671	0.277
97	45° 04.220'	66° 58.710'	15	5.09	0.894	3.10	3.990	0.305
			25	5.01	0.848	3.04	3.506	0.302
			35	4.95	0.853	3.15	3.358	0.291
			45	4.97	0.852	3.13	3.750	0.317
98	45° 02.960'	66° 51.750'	25	4.37	0.773	3.15	3.218	0.276
102	45° 01.270'	66° 52.820'	25	5.39	0.785	5.36	2.308	0.298
103	45° 04.340'	66° 59.800'	5	10.15	1.773	2.99	5.240	0.267
			15	5.30	0.951	2.98	3.702	0.298
			25	5.28	0.888	2.90	3.367	0.277
			35	5.33	0.853	3.04	3.945	0.282

Appendix E. DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Water Column DOC (μMC)	Water Column SD (μMC)	B.O.B. B.O.B. Depth (cm)	B.O.B. DOC (μMC)	B.O.B. SD (μMC)
1	45° 08.380'	66° 59.387'	2	127.78	1.43			
2	45° 08.031'	67° 01.093'	2	118.32	1.81			
3	45° 08.076'	67° 00.203'	2	142.27	3.84			
4	45° 08.165'	66° 59.031'	2	99.25	1.39			
5	45° 08.033'	66° 58.004'	2	219.00	3.66			
6	45° 08.014'	66° 57.057'	2	113.98	0.81			
7	45° 07.993'	66° 56.160'	2	177.36	2.70			
8	45° 06.964'	66° 59.022'	2	132.81	1.05	25	145.40	2.14
9	45° 06.048'	67° 00.944'	2	108.86	2.95			
12	45° 03.875'	67° 00.043'	2	100.71	0.25			
13	45° 04.072'	66° 59.017'	2	96.61	0.85			
14	45° 03.827'	66° 58.220'	2	73.83	1.51			
15	45° 03.996'	66° 57.045'	2	68.14	2.23			
16	45° 04.054'	66° 56.106'	2	72.84	2.30	25	100.80	2.47
17	44° 59.894'	67° 02.790'	2	86.94	1.85			
18	45° 00.025'	67° 01.069'	2	81.94	2.00			
19	44° 59.975'	67° 00.207'	2	72.83	2.15			
20	45° 01.777'	66° 53.087'	2	62.52	1.89	25	58.33	0.91
21	45° 02.332'	66° 52.628'	2	109.60	1.34			

Appendix E (cont.). DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Water Column DOC (µMC)	Water Column SD (µMC)	B.O.B. Depth (cm)	B.O.B. DOC (µMC)	B.O.B. SD (µMC)
22	45° 02.390'	66° 52.160'	2	114.39	3.27			
23	45° 02.320'	66° 51.850'	2	115.44	2.15			
24	45° 02.480'	66° 52.400'	2	156.23	2.72			
25	45° 02.610'	66° 52.180'	2	118.67	1.58			
26	45° 02.620'	66° 52.040'	2	115.48	1.27			
27	45° 02.870'	66° 51.900'	2	86.60	3.21			
28	45° 02.820'	66° 51.770'	2	128.55	3.97	25	119.52	1.54
29	45° 02.900'	66° 51.680'	2	78.90	2.30			
30	45° 03.356'	66° 51.310'	2	228.89	2.43			
31	45° 03.640'	66° 50.970'	2	129.10	2.20			
32	45° 01.200'	66° 51.330'	2	141.80	2.04	25	75.50	1.36
33	45° 01.590'	66° 51.050'	2	147.48	3.95			
34	45° 01.670'	66° 51.050'	2 12	149.57 154.13	1.66 4.90			
35	45° 01.740'	66° 51.320'	2	132.51	4.78			
37	45° 01.800'	66° 50.340'	2	118.44	3.59			
38	45° 01.925'	66° 50.300'	2	93.54	1.66			
39	45° 02.200'	66° 50.530'	2	120.74	3.84			
40	45° 02.150'	66° 50.490'	2	133.92	1.66			

Appendix E (cont.). DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	DOC (µM C)	SD (µM C)	B.O.B. Depth (cm)	B.O.B. DOC (µM C)	SD (µM C)
42	45° 02.155'	66° 50.328'	2	108.2	1.4			
43	45° 02.340'	66° 50.290'	2	133.4	4.1			
44	45° 02.376'	66° 50.450'	2	85.9	1.3	25	91.0	1.4
45	45° 02.346'	66° 52.232'	2	102.8	4.4			
			6	106.3	2.5			
47	45° 02.440'	66° 50.290'	2	130.3	2.1			
49	45° 02.907'	66° 49.871'	2	165.9	2.4			
50	45° 03.000'	66° 49.807'	2	154.9	1.3			
51	45° 03.191'	66° 49.997'	2	70.7	1.3			
53	45° 03.338'	66° 49.981'	2	135.8	1.3			
54	45° 03.508'	66° 49.976'	2	147.6	2.0			
55	45° 03.500'	66° 49.740'	2	123.3	1.5			
56	45° 03.493'	66° 49.503'	2	153.0	2.7			
57	45° 03.685'	66° 49.987'	2	129.0	2.9			
60	45° 03.430'	66° 49.130'	2	116.7	2.5			
			10	93.3	3.5			
61	45° 03.678'	66° 48.793'	2	128.5	0.9			
62	45° 04.009'	66° 48.370'	2	161.4	2.9			
63	45° 04.240'	66° 48.080'	2	148.0	0.9			
			11	129.9	2.7			

Appendix E (cont.). DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Water Column DOC (µM C)	Water Column SD (µM C)	B.O.B. Depth (cm)	B.O.B. DOC (µM C)	B.O.B. SD (µM C)
64	45° 04.511'	66° 48.224'	2	143.4	4.0			
66	45° 05.001'	66° 48.506'	2	89.5	0.8			
67	45° 05.040'	66° 48.730'	2	172.6	2.6			
68	45° 05.173'	66° 48.569'	2	162.3	3.7			
69	45° 04.676'	66° 47.804'	2	202.1	2.4			
70	45° 04.635'	66° 47.218'	2	203.1	5.0			
71	45° 04.850'	66° 47.269'	2	191.6	2.8			
73	45° 05.391'	66° 47.782'	2	123.7	7.4			
74	45° 05.630'	66° 47.990'	2	>300				
76	45° 05.996'	66° 47.168'	2	>250				
78	45° 06.500'	66° 46.814'	2	>250				
79	45° 06.814'	66° 46.229'	3	93.5	1.3			
80	45° 07.130'	66° 46.035'	2.5	>300				
81	45° 03.030'	66° 48.300'	2	158.8	2.7			
82	45° 02.720'	66° 48.790'	2	173.1	3.3			
83	45° 02.050'	66° 48.690'				25	94.5	1.1
84	45° 02.060'	66° 47.720'	15	83.80	2.2			
85	45° 02.450'	66° 47.390'	2	112.83	1.1			

Appendix E (cont.). DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	Water Column DOC (µM C)	Water Column SD (µM C)	B.O.B. Depth (cm)	B.O.B. DOC (µM C)	B.O.B. SD (µM C)
86	45° 02.710'	66° 46.970'				25	116.7	1.6
87	45° 02.690'	66° 47.000'	2	124.8	4.8			
88	45° 04.580'	67° 00.140'	2	132.1	1.9			
			21	125.9	1.9			
			29	125.5	12.9			
89	45° 05.080'	67° 00.810'	2	67.9	1.2			
			14	59.8	2.9			
			28	103.2	2.0			
90	45° 05.670'	67° 01.230'	1	159.5	3.5			
			12	92.8	4.5			
			20	114.0	1.4			
91	45° 05.200'	67° 00.740'	2	129.1	2.6			
			15	89.4	2.6			
			28	88.7	4.4			
93	45° 04.160'	67° 00.120'	2	150.5	2.8			
			23	117.5	2.0			
			34	124.3	1.8			
94	45° 04.100'	66° 59.990'	2	123.5	4.5			
			21	85.0	0.6			
			36	110.2	1.5			
95	45° 04.130'	66° 59.910'	2	177.7	2.6			
			20	93.1	2.1			
			35	151.2	1.3			
96	45° 04.230'	66° 59.480'	3	126.4	7.4			
			20	80.2	1.9			
			38	97.6	0.4			

Appendix E (cont.). DOC concentrations from Niskin casts and B.O.B. casts.

Stn	Latitude (N)	Longitude (W)	Water Column Niskin Depth (m)	DOC (µM C)	SD (µM C)	B.O.B. Depth (cm)	B.O.B. DOC (µM C)	SD (µM C)
97	45° 04.220'	66° 58.710'	2	129.6	2.5	15	144.3	2.9
			22	137.2	1.7	25	169.2	2.2
			42	140.1	3.8	35	160.4	3.1
						45	106.9	0.5
98	45° 02.960'	66° 51.750'	2	140.2	1.3	25	109.8	4.3
			11	100.2	1.8			
			14	115.9	0.4			
99	45° 02.800'	66° 51.980'	2	122.6	4.6			
			9	119.6	3.0			
			15	106.1	1.8			
100	45° 02.480'	66° 52.380'	3	93.4	4.0			
			12	111.2	4.0			
			24	87.9	1.2			
101	45° 02.170'	66° 52.720'	4	126.9	1.5			
			25	85.8	1.6			
			48	127.1	1.0			
102	45° 01.270'	66° 52.820'	2	113.5	1.5	25	112.9	1.0
			35	109.3	9.7			
			68	103.9	2.5			
103	45° 04.340'	66° 59.800'				5	91.1	3.5
						15	117.8	1.6
						25	119.2	4.7
						35	161.3	1.4

Appendix F. Variables in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

Stn	Latitude (N)	Longitude (W)	Sediment Grab						
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (µM)	pH	Moisture (%)	Organic (%)	Sediment Temp. (°C)
1	45° 08.380'	66° 59.387'	-205	4	2900	7.13	64.27	8.42	15.2
2	45° 08.031'	67° 01.093'	-173	36	1300	7.04	64.90	7.49	17.6
3	45° 08.076'	67° 00.203'	-204	5	3800	7.08	59.91	7.23	14.3
4	45° 08.165'	66° 59.031'	-163	46	1400	6.86	65.64	8.33	15.6
5	45° 08.033'	66° 58.004'	-197	12	3500	6.97	63.55	7.60	14.3
6	45° 08.014'	66° 57.057'	-232	-23	2400	7.12	65.63	7.77	16.5
7	45° 07.993'	66° 56.160'	-201	8	2900	6.32	63.23	7.59	15.8
9	45° 06.048'	67° 00.944'	-207	2	1400	7.21	61.96	6.95	14.7
12	45° 03.875'	67° 00.043'	-206	3	1600	7.41	61.58	5.70	14.1
13	45° 04.072'	66° 59.017'	-207	2	560	7.50	66.73	7.87	13.9
14	45° 03.827'	66° 58.220'	-152	57	110	7.12	60.70	6.23	13.7
15	45° 03.996'	66° 57.045'	-145	64	15	7.12	26.70	1.78	14.0
18	45° 00.025'	67° 01.069'	-209	0	220	7.10	55.28	6.17	14.6
19	44° 59.975'	67° 00.207'	-179	30	310	7.15	51.97	6.04	14.1
21	45° 02.332'	66° 52.628'	-212	-3	130	7.17	61.65	6.31	13.2
22	45° 02.390'	66° 52.160'	-236	-27	130	7.42	66.63	7.19	13.2
23	45° 02.320'	66° 51.850'	-196	13	110	6.92	59.46	6.29	13.5
24	45° 02.480'	66° 52.400'	-241	-32	2500	7.06	62.08	7.00	13.5

Appendix F (cont.). Variables in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

Stn	Latitude (N)	Longitude (W)	Sediment Grab						
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (µM)	pH	Moisture (%)	Organic (%)	Sediment Temp. (°C)
25	45° 02.610'	66° 52.180'	-248	-39	280	7.23	65.95	7.96	13.2
26	45° 02.620'	66° 52.040'	-243	-34	160	7.14	63.12	7.29	13.5
27	45° 02.870'	66° 51.900'	-252	-43	560	7.09	67.38	8.38	13.6
28	45° 02.820'	66° 51.770'	-269	-60	180	6.88	63.95	7.42	13.3
29	45° 02.900'	66° 51.680'	-226	-17	430	7.01	65.34	7.49	13.4
30	45° 03.356'	66° 51.310'	-281	-72	36000	6.41	71.58	10.98	13.3
31	45° 03.640'	66° 50.970'	-333	-124	120000	6.93	65.65	10.11	12.9
33	45° 01.590'	66° 51.050'	-149	60	1100	7.16	61.05	6.64	13.2
34	45° 01.670'	66° 51.050'	-219	-10	570	7.12	59.27	6.06	13.8
35	45o 01.740'	66° 51.320'	-187	22	110	7.22	61.09	6.33	13.3
37	45° 01.800'	66° 50.340'	-233	-24	4100	7.29	62.92	6.48	13.7
39	45° 02.200'	66° 50.530'	-227	-18	2200	7.47	62.73	7.36	13.3
40	45° 02.150'	66° 50.490'	-174	35	390	7.25	59.03	6.95	13.3
42	45° 02.155'	66° 50.328'	-180	29	1500	7.22	62.98	7.45	13.5
43	45° 02.340'	66° 50.290'	-216	-7	11000	6.74	62.94	7.79	13.3
44	45° 02.376'	66° 50.450'	-205	4	1100	6.70	67.17	8.06	13.6
47	45° 02.440'	66° 50.290'	-234	-25	11000	6.91	68.70	7.84	13.2
49	45° 02.907'	66° 49.871'	-229	-20	760	7.20	31.79	2.98	18.3

Appendix F (cont.). Variables in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

Stn	Latitude (N)	Longitude (W)	Sediment Grab						
			Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (µM)	pH	Moisture (%)	Organic (%)	Sediment Temp. (°C)
50	45° 03.000'	66° 49.807'	-284	-75	1600	5.97	67.24	8.61	17.6
51	45° 03.191'	66° 49.997'	-287	-78	2100	6.82	60.19	7.26	17.8
53	45° 03.338'	66° 49.981'	-285	-76	1500	6.85	68.15	7.94	17.8
54	45° 03.508'	66° 49.976'	-299	-90	3500	7.15	66.69	13.19	13.4
55	45° 03.500'	66° 49.740'	-272	-63	1300	7.22	64.28	7.16	13.2
56	45° 03.493'	66° 49.503'	-297	-88	460	7.20	41.15	3.30	17.8
57	45° 03.685'	66° 49.987'	-271	-62	1200	5.99	70.50	8.67	13.4
62	45° 04.009'	66° 48.370'	-268	-59	180	7.37	32.83	2.86	17.2
64	45° 04.511'	66° 48.224'	-285	-76	1000	7.10	65.60	7.29	16.7
66	45° 05.001'	66° 48.506'	-285	-76	2100	7.38	60.77	6.54	16.6
67	45° 05.040'	66° 48.730'	-267	-58	9100	6.90	60.32	6.77	16.3
68	45° 05.173'	66° 48.569'	-289	-80	1300	6.94	64.09	6.88	16.4
69	45° 04.676'	66° 47.804'	-299	-90	4900	7.51	58.69	5.64	16.2
70	45° 04.635'	66° 47.218'	-296	-87	2800	7.50	67.52	7.50	16.3
71	45° 04.850'	66° 47.269'	-198	11	38	7.33	67.00	7.20	15.8
73	45° 05.391'	66° 47.782'	-226	-17	260	7.45	65.18	7.58	16.5
74	45° 05.630'	66° 47.990'	-243	-34	297	7.16	63.62	7.76	16.3
76	45° 05.996'	66° 47.168'	-245	-36	1133	7.23	54.19	6.43	16.5

Appendix F (cont.). Variables in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

			Sediment Grab						
Stn	Latitude (N)	Longitude (W)	Pt Electrode Potential (mV)	Eh (NHE) Potential (mV)	Sulfide (µM)	pH	Moisture (%)	Organic (%)	Sediment Temp. (°C)
78	45° 06.500'	66° 46.814'	-211	-2	166	7.07	54.02	5.44	16.4
79	45° 06.814'	66° 46.229'	-261	-51	1380	7.08	-	5.10	16.0
80	45° 07.130'	66° 46.035'	-262	-53	1300	7.06	72.23	9.00	16.1
81	45° 03.030'	66° 48.300'	-329	-120	97000	7.14	62.38	8.01	13.1
82	45° 02.720'	66° 48.790'	-244	-35	13000	7.15	60.49	6.93	13.2
85	45° 02.450'	66° 47.390'	-225	-16	65	7.50	64.88	6.10	12.4
87	45° 02.690'	66° 47.000'	-197	12	29	7.52	57.76	5.66	12.3

Appendix G. Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	1	2	3	4	5	6	7	9	12
As (ppm)	11	11	15	8	10	11	12	10	16
Hg (ppb)	20	10	20	20	30	20	10	<10	<10
Al (%)	7.87	7.69	7.49	7.57	7.69	7.52	7.48	7.82	7.02
As (ppm)	11	11	15	8	10	11	12	10	16
Hg (ppb)	20	10	20	20	30	20	10	10	10
Al (%)	7.87	7.69	7.49	7.57	7.69	7.52	7.48	7.82	7.02
Sb (ppm)	0.8	0.9	0.8	0.8	0.8	1	0.8	0.9	1
Ba (ppm)	410	400	390	340	390	390	390	420	360
Be (ppm)	2.45	2.45	2.2	2.4	2.4	2.25	2.15	2.55	2.25
Bi (ppm)	0.26	0.27	0.26	0.27	0.27	0.27	0.31	0.32	0.27
Cd (ppm)	0.08	0.06	0.04	0.06	0.08	0.08	0.08	0.06	0.06
Ca (%)	0.54	0.59	0.57	0.56	0.55	0.54	0.6	0.64	0.95
Ce (ppm)	74.2	73.7	73.2	70.4	75.2	74	73.2	75.5	67.5
Cs (ppm)	7.85	7.95	7.65	7.85	7.9	7.8	7.9	8.15	7.4
Cr (ppm)	83	81	82	80	82	78	83	81	68
Co (ppm)	18	18.2	17.6	18	18	17.6	15	16.6	14.6
Cu (ppm)	16	17	17	18	18	16	17	17	16
Ga (ppm)	22.7	22.8	22.6	22.4	23.4	22.5	20.6	21.7	19.1
Ge (ppm)	2	2.1	2	2	2	1.9	1.8	2	1.9
Fe (%)	4.03	3.94	3.9	3.89	4.03	3.76	3.85	3.97	3.67
La (ppm)	35.5	35.5	35	34	35.5	35.5	34	36	31.5
Pb (ppm)	21.5	23	21.5	22.5	22	23	25	28	25
Li (ppm)	66.8	65.2	64.2	66.8	67.4	65.4	62.8	66.6	58.2
Mg (%)	1.45	1.47	1.46	1.48	1.48	1.41	1.46	1.51	1.3
Mn (ppm)	470	470	450	470	465	440	450	505	480
Mo (ppm)	1.6	1.2	1	1	1.4	1.4	1.4	0.8	0.8
Ni (ppm)	45.2	45.4	44.2	45.4	47	44.6	39.6	42	39.2
Nb (ppm)	12	12.2	12.6	11.8	12.4	12.6	12	12.2	11.2
P (ppm)	780	870	920	930	910	770	870	860	960
K (%)	2.43	2.42	2.37	2.39	2.43	2.36	2.34	2.45	2.23
Rb (ppm)	131	131	128	131	131.5	130	120.5	128	115.5
Ag (ppm)	0.75	0.75	0.75	0.75	0.8	0.75	0.75	0.75	0.7
Na (%)	2.37	2.98	3.18	2.99	2.92	2.96	2.96	2.67	2.92
Sr (ppm)	117	124	121	124.5	124	120.5	116.5	125	126.5
Ta (ppm)	0.75	0.75	0.75	0.75	0.8	0.8	0.85	0.8	0.75
Te (ppm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Tl (ppm)	0.54	0.56	0.54	0.58	0.56	0.56	0.62	0.66	0.6
Th (ppm)	10	10	9.8	10	10.2	9.8	11.4	11.6	9.8
Ti (%)	0.36	0.35	0.36	0.34	0.36	0.37	0.37	0.37	0.34
W (ppm)	1.2	1.3	1.3	1.2	1.3	1.3	1.5	1.4	1.2
U (ppm)	2.4	2.2	2	2	2.2	2.2	2.6	2.6	2
V (ppm)	117	111	109	110	111	108	111	119	100
Y (ppm)	20.6	20.9	20.5	21	20.9	21.1	19.6	20.5	29.7
Zn (ppm)	100	98	106	98	100	100	100	98	98

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	13	14	18	19	21	22	23	24	25
As (ppm)	9	9	9	14	12	8	9	14	<1
Hg (ppb)	40	40	10	10	10	40	30	50	90
Al (%)	7.12	6.67	6.59	6.92	7.4	7.24	6.96	7.15	7.36
As (ppm)	9	9	9	14	12	8	9	14	1
Hg (ppb)	40	40	10	10	10	40	30	50	90
Al (%)	7.12	6.67	6.59	6.92	7.4	7.24	6.96	7.15	7.36
Sb (ppm)	0.9	1	0.9	1	0.9	0.8	0.8	0.8	0.9
Ba (ppm)	360	340	340	370	380	380	370	370	390
Be (ppm)	2.3	2	2.1	2.15	2.15	2.2	2.2	2.3	2.35
Bi (ppm)	0.3	0.24	0.25	0.25	0.27	0.29	0.29	0.3	0.31
Cd (ppm)	0.12	0.1	0.12	0.1	0.14	0.12	0.1	0.2	0.2
Ca (%)	1.36	1.72	1.81	1.77	1.55	1.07	0.88	1.02	0.97
Ce (ppm)	70	63.7	61.5	64.7	69.6	67.4	68.4	72.8	74.3
Cs (ppm)	7.2	6.35	5.85	6.6	6.95	6.8	6.6	7.1	7.55
Cr (ppm)	74	63	65	70	80	78	75	77	81
Co (ppm)	16.4	13.4	13.8	13.8	16	15.4	15	16.2	16.6
Cu (ppm)	17	13	13	14	18	19	17	20	21
Ga (ppm)	20.6	17.9	17.2	18.3	19.8	19.4	19.1	20.4	21.4
Ge (ppm)	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.8	1.8
Fe (%)	3.68	3.26	3.34	3.59	3.71	3.82	3.5	3.64	3.76
La (ppm)	33.5	30	29	31	33	31.5	32	34	35
Pb (ppm)	27	23.5	26.5	27	25.5	24.5	25.5	28	27
Li (ppm)	60.8	51.6	48.6	52	59	59.2	57.2	62	64.6
Mg (%)	1.44	1.2	1.17	1.3	1.4	1.46	1.35	1.39	1.48
Mn (ppm)	480	455	505	505	490	495	475	470	485
Mo (ppm)	1	0.6	1	0.8	1	0.8	1	2	1.4
Ni (ppm)	40.4	33	32.6	33.8	39.4	37.8	36.6	39.2	42.2
Nb (ppm)	11.4	10.2	8.8	10.6	11.2	11	10.8	12	12.4
P (ppm)	960	860	860	980	960	1000	820	930	1020
K (%)	2.28	2.19	2.08	2.23	2.31	2.28	2.14	2.23	2.3
Rb (ppm)	119.5	111	103.5	112	117	116	112	122	125
Ag (ppm)	0.75	0.6	0.6	0.7	0.7	0.7	0.75	0.8	0.8
Na (%)	3.21	2.56	2.07	2.47	2.86	3.12	2.68	2.87	3.11
Sr (ppm)	143	145	144	156	143.5	133.5	126	133.5	137
Ta (ppm)	0.75	0.7	0.6	0.7	0.7	0.7	0.7	0.75	0.8
Te (ppm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Tl (ppm)	0.58	0.58	0.58	0.56	0.58	0.54	0.52	0.6	0.6
Th (ppm)	10.6	9.2	9.2	9.4	10.2	10	10.2	10.8	10.8
Ti (%)	0.34	0.31	0.31	0.34	0.35	0.35	0.34	0.36	0.36
W (ppm)	1.3	1.1	1	1.2	1.2	1.2	1.4	1.3	1.4
U (ppm)	2.4	2	2	2	2.4	2	2.2	2.6	2.4
V (ppm)	108	91	94	104	109	108	103	105	112
Y (ppm)	20.3	20.2	18.5	20.1	19.3	18.2	19.6	20.1	21.2
Zn (ppm)	92	76	84	86	96	98	88	100	98

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	26	27	28	29	30	31	33	34	35
As (ppm)	4	4	6	10	13	9	11	1	12
Hg (ppb)	60	90	50	100	40	30	30	10	420
Al (%)	7.12	6.99	7.02	6.86	6.55	7.23	7.62	7.35	7.54
As (ppm)	4	4	6	10	13	9	11	1	12
Hg (ppb)	60	90	50	100	40	30	30	10	420
Al (%)	7.12	6.99	7.02	6.86	6.55	7.23	7.62	7.35	7.54
Sb (ppm)	0.8	0.8	0.8	0.8	0.9	1	0.9	0.9	0.9
Ba (ppm)	360	350	360	360	340	370	380	380	400
Be (ppm)	2.3	2.45	2.35	2.2	2	2.45	2.35	2.25	2.5
Bi (ppm)	0.29	0.28	0.31	0.29	0.28	0.3	0.31	0.31	0.31
Cd (ppm)	0.16	0.18	0.24	0.22	0.42	0.54	0.1	0.1	0.1
Ca (%)	0.93	0.92	0.81	0.78	0.85	0.73	1.07	1.08	1.13
Ce (ppm)	70.2	70.5	74.4	70	61.9	75.1	76.7	76	76.4
Cs (ppm)	7	6.9	7.35	6.65	6.5	7.45	7.7	7.55	7.6
Cr (ppm)	71	76	74	71	71	75	81	73	83
Co (ppm)	15.4	15.2	16.2	14.6	13.6	15.2	17	17	17
Cu (ppm)	20	22	23	22	30	27	16	17	19
Ga (ppm)	19.9	19.5	20.7	19.2	18.4	20.9	21.6	21.6	21.8
Ge (ppm)	1.7	1.8	1.9	1.5	1.7	1.8	1.9	1.9	1.9
Fe (%)	3.66	3.68	3.6	3.51	3.35	3.65	3.82	3.79	3.77
La (ppm)	33	33	35	33	28.5	34.5	36	35	36
Pb (ppm)	26	26	28.5	25.5	23	27.5	28.5	26.5	27.5
Li (ppm)	59.6	60.8	63.2	59.4	56.2	63.8	66	66.4	66.4
Mg (%)	1.38	1.35	1.36	1.35	1.42	1.38	1.37	1.41	1.43
Mn (ppm)	460	450	450	455	405	435	490	500	510
Mo (ppm)	1	1	1.6	1.2	2.2	5	1.2	1	1
Ni (ppm)	39.2	39.8	40.6	36.6	35	40.2	41.4	41.4	45
Nb (ppm)	11.8	11.4	12.2	11.6	9.8	12	12.6	11.8	12.8
P (ppm)	990	1120	1030	960	1710	1650	900	920	900
K (%)	2.24	2.18	2.18	2.13	2.1	2.26	2.36	2.31	2.35
Rb (ppm)	117	114.5	123	111.5	110.5	126.5	128.5	127.5	127
Ag (ppm)	0.75	0.8	0.8	0.75	0.75	0.85	0.8	0.75	0.8
Na (%)	3.08	2.98	3	2.95	3.76	2.91	2.54	2.86	2.72
Sr (ppm)	129	131.5	131.5	126.5	133	132	131.5	137	138
Ta (ppm)	0.75	0.75	0.8	0.75	0.65	0.8	0.8	0.8	0.85
Te (ppm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Tl (ppm)	0.58	0.58	0.62	0.56	0.6	0.7	0.62	0.6	0.62
Th (ppm)	10.2	10.4	11	10.2	9.6	11	11.2	11	11.4
Ti (%)	0.36	0.35	0.35	0.35	0.31	0.36	0.37	0.35	0.37
W (ppm)	1.3	1.3	1.4	1.3	1.2	1.5	1.5	1.4	1.4
U (ppm)	2.2	2.2	2.6	2.2	2.6	3.6	2.6	2.4	2.4
V (ppm)	104	103	104	101	101	109	108	109	112
Y (ppm)	19.3	19.5	20.9	19.7	18.3	21.6	21	21	20.7
Zn (ppm)	94	100	96	92	102	120	130	92	94

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	37	39	40	42	43	44	50	51	53
As (ppm)	10	13	4	11	15	11	16	11	11
Hg (ppb)	50	50	10	10	30	20	70	100	30
Al (%)	7.05	7.22	7.47	7.33	7.35	7.03	7.14	7.48	7.47
As (ppm)	10	13	4	11	15	11	16	11	11
Hg (ppb)	50	50	10	10	30	20	70	100	30
Al (%)	7.05	7.22	7.47	7.33	7.35	7.03	7.14	7.48	7.47
Sb (ppm)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9
Ba (ppm)	370	380	400	370	390	370	360	380	380
Be (ppm)	2.2	2.35	2.5	2.5	2.35	2.35	2.1	2.1	2.25
Bi (ppm)	0.27	0.3	0.32	0.31	0.3	0.3	0.27	0.27	0.27
Cd (ppm)	0.08	0.14	0.12	0.1	0.2	0.18	0.32	0.16	0.18
Ca (%)	1.37	0.85	0.86	0.94	0.74	0.78	0.97	0.72	0.77
Ce (ppm)	69.4	75.8	75	76.8	73.3	67.2	66.3	68.4	68.5
Cs (ppm)	6.95	7.25	7.4	7.6	7.45	7.3	7.15	7.05	7
Cr (ppm)	71	73	76	72	76	69	73	74	74
Co (ppm)	15.6	16.2	16	17	16.2	15.8	16.4	16	16.2
Cu (ppm)	17	20	20	18	30	21	28	32	25
Ga (ppm)	19.8	20.8	20.7	21.4	20.9	20.5	20.9	20.5	20.5
Ge (ppm)	1.7	1.7	1.9	2	1.9	1.8	1.9	1.9	1.8
Fe (%)	3.49	3.62	3.77	3.71	3.74	3.66	3.62	3.87	3.79
La (ppm)	32.5	35	35	36	34.5	31	31.5	33	33.5
Pb (ppm)	24	27.5	29.5	28	27.5	31	23.5	23.5	24
Li (ppm)	60	64.2	63.4	66.2	63.6	61.8	58.4	57.6	57.6
Mg (%)	1.38	1.42	1.4	1.38	1.43	1.45	1.42	1.4	1.4
Mn (ppm)	460	480	495	475	475	450	430	470	460
Mo (ppm)	0.8	1	1.2	1	1.6	1.2	2.6	1.2	1.2
Ni (ppm)	37.4	39.4	38.8	41.4	39.8	39.4	41.2	41.2	39.4
Nb (ppm)	11	12.4	11.8	12.6	11.8	12	11.8	11	11.6
P (ppm)	1020	970	870	910	1060	1060	2490	1140	1240
K (%)	2.24	2.26	2.31	2.29	2.28	2.24	2.31	2.37	2.36
Rb (ppm)	118	123	123.5	126.5	122.5	116	116	118.5	119
Ag (ppm)	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.75	0.75
Na (%)	3.37	3.22	2.53	2.76	2.76	3.54	3.01	3.04	3.02
Sr (ppm)	145.5	134.5	129.5	133.5	128.5	131.5	139	124.5	124.5
Ta (ppm)	0.7	0.85	0.8	0.85	0.8	0.8	0.75	0.7	0.75
Te (ppm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Tl (ppm)	0.58	0.6	0.6	0.6	0.62	0.58	0.58	0.54	0.54
Th (ppm)	10	11	11.2	11.4	11	10.2	9.4	9.8	10
Ti (%)	0.33	0.36	0.36	0.36	0.35	0.35	0.34	0.33	0.35
W (ppm)	1.2	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.2
U (ppm)	2	2.4	2.6	2.6	2.6	2.2	2.8	2.2	2.2
V (ppm)	101	105	109	105	111	103	107	108	107
Y (ppm)	19.1	20.5	21.8	20.7	20.5	19.1	19.8	19.8	20.2
Zn (ppm)	86	94	94	90	102	92	128	102	100

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	54	55	56	57	62	64	66	67	68
As (ppm)	9	14	15	17	19	12	16	12	9
Hg (ppb)	40	30	70	50	10	50	30	10	40
Al (%)	6.22	7.25	6.63	6.83	6.04	7.01	7	7.4	7.31
As (ppm)	9	14	15	17	19	12	16	12	9
Hg (ppb)	40	30	70	50	10	50	30	10	40
Al (%)	6.22	7.25	6.63	6.83	6.04	7.01	7	7.4	7.31
Sb (ppm)	1	0.9	0.9	0.8	1.1	0.8	0.8	0.8	0.9
Ba (ppm)	320	380	360	350	340	370	360	360	380
Be (ppm)	2.2	1.95	2.3	2.3	2.1	2.1	2.15	2.4	2.25
Bi (ppm)	0.29	0.31	0.17	0.28	0.15	0.26	0.28	0.29	0.27
Cd (ppm)	0.36	0.16	0.06	0.36	0.02	0.08	0.1	0.1	0.1
Ca (%)	4.1	0.91	0.99	0.81	1	0.68	0.68	0.59	0.63
Ce (ppm)	67.8	65.4	63.4	71.8	58.4	62.8	70.1	71.9	70.6
Cs (ppm)	6.6	6.7	4.75	7.2	3.85	6.55	6.65	7.2	6.95
Cr (ppm)	61	74	44	70	36	72	68	72	73
Co (ppm)	13.4	15	9.6	15	8.2	15	14.4	15.2	14.8
Cu (ppm)	30	22	9	41	7	19	17	17	17
Ga (ppm)	18	19.6	17.3	20.2	16	19.6	19.5	20.9	19.6
Ge (ppm)	1.5	1.8	1.7	1.8	1.6	1.7	1.8	1.9	1.9
Fe (%)	2.95	3.74	2.7	3.51	2.37	3.58	3.4	3.66	3.51
La (ppm)	32	32	29	33.5	26.5	30	32.5	33.5	33.5
Pb (ppm)	26	25.5	22.5	24.5	18	22	22.5	23	22
Li (ppm)	54	53.6	36.6	62	31.2	54.4	53	58.2	56.4
Mg (%)	1.27	1.41	0.84	1.43	0.68	1.41	1.24	1.27	1.32
Mn (ppm)	375	480	425	420	375	475	430	430	445
Mo (ppm)	2	1.4	0.8	2.6	0.6	1	1	1.2	1
Ni (ppm)	35	37.2	21.8	38.6	19.4	37.6	36.8	39.4	38.2
Nb (ppm)	11.2	11	11	11.4	10.8	11.8	11.6	13.2	11.8
P (ppm)	1450	1200	910	1990	740	1070	900	870	880
K (%)	2.01	2.31	2.36	2.2	2.31	2.28	2.22	2.32	2.31
Rb (ppm)	109	112	114	119	114	113	118	122	119
Ag (ppm)	0.8	0.75	0.55	0.75	0.55	0.7	0.75	0.8	0.75
Na (%)	3.24	3.24	2.53	3.63	2.27	3.18	2.91	2.79	2.86
Sr (ppm)	237	129	142	145	145	122	118	111.5	115
Ta (ppm)	0.7	0.75	0.8	0.75	0.75	0.75	0.75	0.85	0.75
Te (ppm)	0.05	0.05	0.05	0.05	<0.05	0.05	0.05	0.05	0.05
Tl (ppm)	0.58	0.54	0.6	0.64	0.52	0.52	0.54	0.56	0.54
Th (ppm)	9.8	9.8	8.2	10.6	7.2	9.2	9.8	10.4	10.2
Ti (%)	0.31	0.33	0.28	0.34	0.26	0.34	0.33	0.38	0.35
W (ppm)	1.3	1.3	1	1.3	0.9	1.2	1.2	1.4	1.5
U (ppm)	2.8	2.2	1.6	2.8	1.4	1.8	2	2	2
V (ppm)	92	103	70	102	63	104	94	100	100
Y (ppm)	19.8	19.3	19.9	19.3	18.7	19.8	20.4	21	20.5
Zn (ppm)	116	98	60	114	52	90	84	90	92

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	69	70	71	73	74	76	78	79	80
As (ppm)	16	5	9	16	16	3	8	6	17
Hg (ppb)	140	370	520	50	70	10	20	50	70
Al (%)	6.98	7.22	7.45	6.89	7.14	6.97	7.04	6.69	6.83
As (ppm)	16	5	9	16	16	3	8	6	17
Hg (ppb)	140	370	520	50	70	10	20	50	70
Al (%)	6.98	7.22	7.45	6.89	7.14	6.97	7.04	6.69	6.83
Sb (ppm)	1	0.8	0.9	0.9	0.9	0.9	0.9	1	1.1
Ba (ppm)	370	390	420	360	380	330	340	330	340
Be (ppm)	2.05	2.3	2.75	2.45	2.45	2.5	2.6	2.5	2.65
Bi (ppm)	0.21	0.3	0.32	0.32	0.31	0.27	0.28	0.21	0.33
Cd (ppm)	0.08	0.08	0.08	0.1	0.08	0.1	0.12	0.08	0.1
Ca (%)	0.88	0.81	0.71	0.72	0.71	2.67	1.28	0.79	0.7
Ce (ppm)	64	74.8	78.4	76	75	71.4	73.3	65.7	76.2
Cs (ppm)	6.2	7.25	8	7.4	7.4	6.9	6.95	5.15	7.3
Cr (ppm)	64	71	77	66	72	62	64	49	66
Co (ppm)	14.2	14.8	16.2	14.4	14.4	13.2	13	10	14
Cu (ppm)	18	21	21	18	18	15	14	11	16
Ga (ppm)	19.6	20.3	22.2	20.7	20.5	20	20.2	18.9	19.6
Ge (ppm)	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.6	1.7
Fe (%)	3.48	3.6	3.71	3.45	3.6	3.06	3.2	2.72	3.8
La (ppm)	29.5	34.5	36	34.5	34	32.5	33	29	33.5
Pb (ppm)	20.5	25.5	27.5	25.5	23.5	22	21.5	17	23.5
Li (ppm)	51.2	61.6	67.8	61.8	62.6	62.2	58.6	47	60
Mg (%)	1.29	1.4	1.43	1.32	1.41	1.15	1.15	0.93	1.28
Mn (ppm)	430	475	490	465	495	425	445	435	565
Mo (ppm)	1	1	1.4	1	1	0.8	1	1	1.2
Ni (ppm)	36	37.2	40.6	36.4	36.4	34.2	33.6	25.6	35.8
Nb (ppm)	11.4	12.6	12.4	12.8	12.6	11.8	12	12.6	12.6
P (ppm)	1170	1090	1060	1150	1260	830	900	780	1430
K (%)	2.34	2.29	2.34	2.24	2.29	2.25	2.25	2.22	2.15
Rb (ppm)	117.5	125	136.5	128.5	127	128	129	124	122.5
Ag (ppm)	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.75
Na (%)	3.42	3.26	2.67	3.55	3.45	2.73	2.6	2.49	3.37
Sr (ppm)	139	134.5	130.5	134.5	132	163.5	132.5	125.5	133.5
Ta (ppm)	0.75	0.85	0.8	0.85	0.85	0.8	0.8	0.9	0.85
Te (ppm)	<0.05	0.05	0.05	0.05	0.05	0.05	0.05	<0.05	0.05
Tl (ppm)	0.52	0.6	0.64	0.62	0.6	0.6	0.62	0.6	0.6
Th (ppm)	8.6	11.4	11.6	11.4	11.6	11.4	11.4	10.2	12.4
Ti (%)	0.33	0.37	0.34	0.34	0.36	0.33	0.34	0.36	0.35
W (ppm)	1.2	1.4	1.8	1.4	1.4	1.4	1.4	1.4	1.6
U (ppm)	1.6	2.2	2.4	2.2	2.2	2.4	2.4	2.4	2.2
V (ppm)	97	104	112	99	104	90	90	77	93
Y (ppm)	19.5	21.1	21.3	21.8	20.7	21.5	22.9	22.5	21.6
Zn (ppm)	84	90	102	86	94	84	92	70	96

Appendix G (cont.). Trace metals in sediments from grab samples taken in the Letang/Passamaquoddy Bay area 7-17 September, 1999.

STATION	81	82	85	87
As (ppm)	8	8	9	5
Hg (ppb)	70	40	50	90
Al (%)	7.51	7	6.9	6.82
As (ppm)	8	8	9	5
Hg (ppb)	70	40	50	90
Al (%)	7.51	7	6.9	6.82
Sb (ppm)	0.8	0.9	0.8	0.8
Ba (ppm)	400	370	360	360
Be (ppm)	2.35	2.4	2.2	2.15
Bi (ppm)	0.32	0.3	0.28	0.28
Cd (ppm)	0.44	0.16	0.08	0.08
Ca (%)	0.56	1.22	1.08	1
Ce (ppm)	75.4	72.3	69.1	73
Cs (ppm)	7.6	6.85	6.7	6.45
Cr (ppm)	78	69	71	66
Co (ppm)	16.4	15.2	15.4	15
Cu (ppm)	27	22	16	15
Ga (ppm)	21.5	19.8	19.7	19.6
Ge (ppm)	1.8	1.8	1.6	1.8
Fe (%)	3.79	3.58	3.59	3.43
La (ppm)	35	33.5	32.5	34
Pb (ppm)	31.5	27	23.5	25
Li (ppm)	66.2	60	61.6	57.6
Mg (%)	1.39	1.37	1.38	1.24
Mn (ppm)	440	465	490	485
Mo (ppm)	4.6	1.2	0.8	1
Ni (ppm)	41	37.2	37	36.2
Nb (ppm)	12	11.8	11.4	11.4
P (ppm)	870	1110	1040	920
K (%)	2.34	2.23	2.19	2.08
Rb (ppm)	126	117	113	112.5
Ag (ppm)	0.8	0.75	0.75	0.75
Na (%)	2.86	3.3	3.6	2.71
Sr (ppm)	121	146	135.5	133
Ta (ppm)	0.8	0.75	0.75	0.8
Te (ppm)	0.05	0.05	0.05	0.05
Tl (ppm)	0.7	0.56	0.54	0.52
Th (ppm)	11.4	10.8	10.2	10.6
Ti (%)	0.36	0.35	0.34	0.35
W (ppm)	1.4	1.3	1.3	1.2
U (ppm)	3.4	2.2	2	2.2
V (ppm)	113	103	97	95
Y (ppm)	20.4	20.4	19.1	19.7
Zn (ppm)	122	96	96	80